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CANADA IN WORLD MARKETS [1]

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To speak of markets in times like these is to enter upon a greatly complicated subject involving questions of monetary policy, of exchange, of credit, of currency, of international relationships, both in a political and commercial sense—questions over which the fiercest controversies rage, and about which the doctors differ with loud disputation. But here in Canada this we know: That we have lost markets or have retained them by selling our goods below cost with consequences serious for the present, and still more ominous for the future. What, if any, are the prospects of a recovery of these lost markets? And can we ourselves make a contribution to this desired end?

We begin only now to realize the vast chasm in the world's social and economic structure made by the war. The conditions for international trade before the war in contrast with those of the present were utopian as Keynes points out in the second chapter of his Economic Consequences of the Peace. The pre-war restrictions to world trade were inconsiderable; and there was a world standard of exchange that worked. There was a large application of the principles of laissez-faire; and it delivered the goods, creating, as Keynes shows, the vast volume of wealth which carried the world through the war. The war let loose forces and passions now coming to full flower in the universal attempt to turn nations into self-sufficient entities. A philosophy of national exclusiveness has developed. "We are announcing nothing new" says an English writer, A. R. Orage, on economics and finances, "when we announce the approaching end of international trade as a major factor in modern life." The sensible attitude, according to this writer, is "to start building a new world based on the full satisfaction of the home market, (which we call economic nationalism) on and out of the ruins of the old world based, as it was, on the satisfaction of international markets at the expense of one's own." In obedience to this curious doctrine the governments have wrecked the world's international monetary machinery, and in its place have had to attempt extensive interferences with trade and exchange for the purpose of controlling international payments. The outcome has been the virtual strangulation of international trade, with consequences now becoming only too clear.

This theory of trade exclusiveness rigidly applied must be fatal to Canada. We must have markets. Cut us off from contacts with the outside world, and we shall suffocate. This is doubly true of western Canada. We have lost market after market. But one free market remains—con-

[1] Summary of an address delivered on June 17, 1932, to the twelfth annual convention of the Canadian Society of Technical Agriculturists at the Manitoba Agricultural College, Winnipeg, Manitoba.

tingently. Great Britain has become protectionist to the world but it is still free trade in its attitude towards the nations of the Empire under a time limit which expires on November 15th. In the interval the Imperial Economic Conference will be held. All the British nations are turning with pathetic eagerness to the Conference in the hope that somehow it will show a means of escape from the doom threatened by the disappearance of markets, and the contraction of trade. The Conference can, if it will, do much for the British nations and the world. It can, over a quarter of the world, both as to area and population, increase facilities for trading by agreeing that within this area tariffs, where there are any, shall be competitive and not prohibitive in character.

Facility of exchange within this area is also essential. While the difficulties of establishing an Empire Currency in the sense in which these words are ordinarily used may well prove insuperable, it will be found highly desirable to maintain the relationship of the various monetary units of the Empire constant over comparatively long periods of time. This can only be achieved if there is a balance of trade, in and out, between the nations of the commonwealth as a whole. Otherwise the ratio of exchange cannot be maintained. For Canada this means that unless we can induce Great Britain to invest capital in Canada on a large scale, we shall have to find a market for British goods roughly equal to the British market for Canadian goods. This we have not yet done. Our "favorable balance of trade" with Great Britain since Confederation exceeds five billion dollars. Last year we had the best of it by seventy-two million dollars, and by about eighty millions with the Commonwealth at large. We look for enlarged markets within the Commonwealth; and we shall have to give an enlarged market in return, not only to take up the present slack but to offset the increased sales that we hope to make. If we are not prepared to do this, the Ottawa Conference can do nothing for Canada.

Provided we are willing to match markets for markets we may reasonably hope for some enlargement of markets within the Empire for our products as an outcome of the Conference. Not much can be hoped for in the case of wheat and flour; but there will be opportunities with respect to pig products, cattle, dairy products, canned goods, tobacco, lumber, hemp and flax fibre, fresh fruit. No doubt with lowered tariffs within the Empire there will also develop fields for the enlarged export of processed and manufactured articles—pulp, paper, furniture, machinery, etc. In the readjustments over so large an area there will be gains offsetting losses, resulting in a net advantage. There is some possibility that the British market for foodstuffs may be exclusively supplied from the Empire countries, with the exception of dairy produce and bacon from Scandinavia: beef and wheat from Argentina. But within the Empire there will be vigorous competition with a strong likelihood that in all these respects there will be a determined effort by Great Britain to supply an increasing proportion of her own needs. It is very apparent that a vigorous effort is going to be made to get a tariff imposed in Great Britain upon imports agricultural in character from the Dominions; in that case we shall have only a preference in the British markets and not free entry. It is unreasonable, the Times said recently, to suppose that "our own agricultural in-

dustries can prosper without some shelter from the competition of producers in the Dominions." Any attempt by Canada to dump agricultural products in Great Britain by an adaptation of the "Paterson plan" of Australia, or through the operations of government export boards, would be resented and would powerfully strengthen this movement for special protection by tariff of the British producer.

But even if the Economic Conference takes full advantage of this opportunity for freer trade within the Commonwealth, this does not solve the question of markets for Canada, or for Great Britain. A trade consolidation of the British Empire, if it took the form of a challenge to the rest of the world inviting retaliation, could not but be disastrous alike to the British nations and the world. The Empire cannot supply its constituent parts with the markets necessary to their prosperity. Inter-Empire trade is only 11 per cent of the trade of the world; the trade between the nations of the Empire and the outside world is 34 per cent of the trade of the world. These figures are in themselves conclusive as to the value of reciprocal trade, both to the British nations and to the rest of the world. Two-thirds of the trade of Great Britain is outside the Empire; in 1931 the percentages of external trade were: imports 70 per cent; exports 60 per cent. The figures for Canada are still more suggestive. In 1931 Canada's imports from the Empire were 25.66 per cent; from outside 74.34 per cent. Exports to the Empire were 38.51 per cent; to the outside world 61.49 per cent. Despite the determined attempts of politicians to destroy it by hostile tariffs, our trade with the United States is still, as it has been for generations, twice what it is with Great Britain. International trade in reality takes place between individuals, not nations, and the people of Canada and of the United States insist upon trading with one another whatever the politicians may think about it. The economic structure of Canada—and the very existence of western Canada—rests upon the sale abroad of from 250 to 350 million bushels of wheat a year. Great Britain, even under quota or preferential arrangements, cannot be counted upon to take more than about 100 million bushels; and even this is contingent upon the production of home-grown wheat not increasing, as may be the case, under the encouragement of the domestic quota. We need continued access to every one of the 53 countries to which we now sell our wheat.

The deliberations of the Conference must therefore not be dominated by any purpose of consolidating the Empire as an economic unit contra mundum. This idea has been put forward but it has been repudiated by British public men, Macdonald, Runciman and others, all of whom envisage the Conference as an agency towards facilitating trade throughout the world. It is quite clear that following the Conference Great Britain will be willing to make special trade relations with all countries willing to give concessions for concessions. Canada will equally require freedom to make her own arrangements with countries which can supply needed markets for our products; and our representatives at the Conference should, therefore, co-operate willingly with the statesmen of Great Britain in the purpose set forth by Mr. Runciman: "The Conference is the first step. The next step is to extend the area of our world trade among those who are also ready to extend advantage to us."

ON LOWERING COST OF PRODUCTION [1]

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Despite the fact that, in late years, reference has been made repeatedly to what is called the 'farm problem' as if to suggest either that a problem has existed where none existed before or that the present problem is something unique and different in character from all preceding ones, all who are in the least conversant with agricultural realities understand full well what is meant.

Briefly the big, permanent, central problem of those engaged in agriculture, as indeed of those engaged in any other occupation, is how best to raise their economic status, how to improve their material standard of living. Thinking people of all times and places have had to decide on a particular working philosophy of life, have had to make up their minds as to just what plan of action should be followed in order to get the most out of life. As a result there has been an age-long struggle between materialism on the one hand and idealism on the other. Probably the emphasis tends to be placed on one or the other depending on the stage of development or upon the degree of success and satisfaction achieved after having put either philosophical claim to the test. Certain it is that a minimum of materialism must always precede even the concept of idealism. People must be able to make some sort of a living before they can begin to think of how to live well. While it is probably true that humans cannot live by bread alone, it is at least equally and perhaps more obviously true that they cannot live without bread.

Whether because of the impetus given by the rapidly-developing productive mechanism of the past century, or because of the generally low material level at which society found itself a century or so ago, or because of the temptation to use rich material resources, or because of the philosophical preachings, the fact remains that we in 1931 find ourselves members of a society which by its acts if not by its words believes strongly in the wisdom of satisfying material desires. It may be that the leaders of society will gradually decide that making a living is not living and may seek to moderate somewhat the economic pace. Meanwhile, and so far ahead as it is practically necessary to look, the real problem of the Smiths and the Greens and the Browns is how best to keep reasonably in step with the Jones family.

Leaving then to the philosophers and to the future the task of passing judgment on our present plan of action and assuming that we are building on a reasonably solid base, we will quite naturally ask ourselves in all seriousness, how best we may set about solving the aforesaid 'farm problem'. Presumably there are but three general ways in which the farmers' economic level or standard of living can be raised. The first is by finding ways and means of lowering producing costs on the farm. The

[1] Prepared as Bulletin No. 27 of the Canadian Credit Institute.
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second is by decreasing costs of marketing while passing back to the farmer the results of these savings in the form of additional prices. The third is by trying to secure more value for what money the farmer does get for his produce when it comes to spending that money on those articles which make up what he calls his standard of living. Boiled down these three methods mean simply greater efficiency in production on the farm, in handling after leaving the farm, and in buying for consumption on the farm. Or put in more technical language it is a question of the economics of production in the narrower sense, economics of marketing, and economics of consumption. Still more briefly it means the advocacy of greater efficiency all along the line. In what follows attention will be concentrated on the first of these methods.

The reason for this concentration is that this particular method has, generally speaking, met with most general favour in the past, is being experimented with at present and is being more and more advocated as likely to bring success in future. The real purpose of this discussion is to try to explain why the method has received and is receiving such a marked degree of popularity and whether and to what extent this large measure of confidence in it is justified.

To the writer it appears no mere accident that chief emphasis has been placed on the policy of lowering production costs. On the contrary it seems but a perfectly natural development. In order to substantiate such a view it is quite possible to list a number of reasons. To begin with it must be remembered that agriculture was not always of the commercial sort. So long as farmers produced for themselves only, were self-sufficing, were not only the producers but also the consumers, it can readily be understood that the only way to increase the amount available for consumption, that is to raise the then standard of living, was to produce more efficiently. Since exchange, and therefore selling followed by buying, did not take place, there was no possibility of securing gains in either marketing farm produce or purchasing goods for consumption on the farm.

Next it is also an historic fact that when agriculture changed from the self-sufficing to the commercial basis, it did so only gradually. In fact, in most cases, it is still only partly commercial, although, with the development of more specialized types of farming, bound to become more so. Now it so happened that the development of commercial agriculture necessarily coincided with the development of the principle of specialization in economic life in general. This meant that this specialization principle was applied in various marketing functions including those of selling and buying. In other words the people who came to do the marketing were self-appointed specialists. It also happened that coincidentally with the development of both commercial agriculture and marketing on the part of special functionaires went the virtually wholesale belief in the efficacy and suitability of competition as a dispensor of economic justice.

Competition was supposed to guarantee fair prices to both sellers and buyers. Farmers might choose to do their own marketing and buying but in doing so were only usurping the positions of others who were likely to be more efficient because more specialized. And so far as

securing better prices was concerned, this was held to be out of the question since active competition would exist in any case and would act as the automatic guarantor of fairness in the matter of prices. With such a belief in both specialization and competition why should anyone advocate that the farmer's lot could be improved by his or any outside interference in anything outside his farm production operations? Let the farmer do what he could to improve production but let him keep hands off everything else since nothing else was any of his special business .

Then again in the earlier stages of our agricultural development (I refer now to Canadian agriculture) there was what we might call an assured market at a reasonable price. There was what we would call today a seller's market. Such a condition suggested that the natural way to increase profits was to increase the volume of production. This was the era in which our governments and agricultural colleges were doing their utmost to tell farmers that the one sure road to economic salvation was to make two or three or, better still, half-a-dozen blades grow where only one grew before.

Aside from the above mentioned causes there are others of at least equal importance which have arisen primarily because of the nature of the agricultural industry. That industry has proved itself everywhere to be the last stronghold of individualism. Despite the recent important experiments in corporation and other large-scale farming ventures, the family-sized farm has always been and still remains the rule. This retention of the individually-owned and operated farm has meant that the farmer has remained highly individualistic in thought, action, and general outlook. So far as farm production operations are concerned, little consideration of acting other than individually has resulted for the simple reason that little combined action in that realm has been necessary. And unless necessity dictates otherwise human beings always and everywhere prefer to seek the greatest possible freedom of action. Combined action means compromise and people are loathe to compromise even in marriage. When one realizes how individualistic the farmer is, and when one further realizes that any worthwhile attempts at securing greater economies in either marketing or purchasing mean co-operative action, one can readily understand why, insofar as the farmer himself is concerned, the cost-reduction idea makes its appeal. It is the one and only method which he can adopt and still act individually. Besides, this same independence allows him the very real advantage of acting without delay.

The nature of the industry invited experiments in cost reduction for still other reasons. Farming takes place in the open, not behind the closed doors of a factory or an office. This means that few of the productive processes as well as the results of varying productive methods can be kept secret. They are continually if unwillingly laid bare to the gaze of all whom it may concern. And they are certain to concern other farmers in the vicinity first of all and may attract the notice of other passers by some of whom may even be officials from the government departments of agriculture. Moreover farmers not only see one another's production practices and resulting products but they discuss such matters freely. Even a most casual observation and discussion of this sort early

disclosed to neighbour farmers as well as outsiders great differences in production methods and results, which differences were taken as indicating corresponding differences in costs. One farmer finds a neighbour's corn is two feet higher than his own. He knows that the neighbour has cultivated oftener than he has. He resolves to follow that example in future. Or he cannot account for the difference in the corn but has curiosity enough to keep on looking for an explanation. Everything he sees about him either on his own farm or on those of others appears to have a cause and effect relationship and appeals to his competitive instinct. At this point one might well enquire how it is possible for the farmer to vary his practices, to experiment so much. The fact is that farm production is the act of combining a number of separate factors. Since it is possible to obtain "*something*" in the way of product irrespective of how the factors are combined there are many lines of attack open to the farmer experimenting in the matter of productive efficiency. The number and variety of combinations depends only on the ability to vary the quantity or quality of any or all of the factors. The existence of so many variables in the problem provides encouragement to experimentation by the farmer himself as well as by special investigators each of whom is specially informed regarding some one of these farm production factors. For example, one is an animal husbandry specialist, one a cereal husbandman, another a soil chemist, another a bacteriologist, another a dairy chemist and so on down the list. But there is one very important thing to note regarding all these people. It is that they are all engaged in one or another of the so-called exact sciences as distinguished from the other group generally known as the social sciences—history, philosophy, ethics, sociology, politics, economics, etc. This is most significant. Historically speaking the latter group has lagged considerably behind the former in point of evolutionary development. More specifically, that special social science called agricultural economics has lagged behind physics, chemistry, biology, bacteriology, etc., as applied to agriculture. The reason is partly historical, partly natural. At a time when demand for farm products seemed unlimited, it was but natural that all interested in agriculture should strive to do everything possible to increase production. In so far as it was thought desirable to supplement the work of practical farmers by the setting up of a government agricultural policy, that policy was designed to foster increased production. If increased production meant also cheaper production so much the better, but an increased production there must be. So long as the market was deemed to be satisfactory no one was likely to think seriously of studying prices and price influences. There did not seem to be any immediate necessity for applying economic science to agriculture. Furthermore it is much easier to carry on laboratory experiments in a physical or chemical laboratory than in an industrial or business laboratory. In the former it is possible to control absolutely all the factors save the one you wish to vary, whereas in the world of business which is the only laboratory one can use for economic experiment, most of the factors are dynamic, subject to change, and are outside the control of the investigator. The reason is that in the first case the data dealt with are non-human, whereas in the second case you are dealing with the actions and reactions

of human beings in the everyday world of business. Realizing these differences and recalling to mind that both marketing and purchasing are certain to result early in price consideration since both imply exchange at some price, we find a still further reason for giving special emphasis to production if not to cost of production problems. If we add to all that has been said the further fact that all specialized marketing agencies have naturally consistently opposed farmer or governmental interference in their sphere of action, together with the government's natural unwillingness to interfere in class conflicts, we shall have, I believe, a reasonably complete list of the reasons why production and cost of production questions have received such a large degree of emphasis heretofore.

Passing now from the reasons for undertaking cost of production studies, we may consider briefly the essence of lowering costs. What does lowering cost really mean or how are lower costs effected? To answer this question it is necessary to revert to our statement that farm production takes place by the act of combining a number of factors. These factors include such things as the farmer himself, his land, farm implements, hired men, fertilizer, livestock, seed, etc. The essential fact to remember is that each and all of these factors costs money. They all have a money valuation. This being the case it behooves the farmer to economize as much as possible when using them. Whatever results in the way of product represents a certain expenditure of each of several factors. No production can take place without *some* such expenditure. The objective is to secure the maximum of product with the minimum of expenditure. To accomplish this result the farmer must have a variety of information some of it physical and some of it economic in character. He must know the different ways in which productive factors may be combined; must know the difference in physical product likely to result from each variation of the factors either quantitatively or qualitatively; must know the price per unit of each factor and each quality of each factor; and must know the price to be obtained for each unit of the product. Even the briefest reflection will show that it is impossible to do better than approximate these theoretic requirements. The practical point is that the nearer they are approximated the lower is the cost of production. It is the inequality in the ability and inclination to secure this information that gives rise to the inequality in costs and consequent profits. The possibility of lowering costs further consists in the ability and the will to obtain and use more of this information. It is obvious that, if this information was 100 per cent obtainable and full advantage taken of the fact, the last word would have been said on production and cost.

We began by stating that the real object of lowering production costs was to raise the farmer's economic level. As yet no attempt has been made to explain the cause and effect relationship supposed to exist between decreased costs and increased profits. Our next and final step, therefore, is to examine the possibilities and limitations of the cost-reduction method.

When attempting this task it is extremely important to note that the so-called factors of farm production are of two classes, fixed or constant factors and variable factors. In the first class may be listed the land area, the farmer himself, his wife and to a considerable extent his children, the

farm buildings, farm machinery, all permanent improvements, and very often *the* hired man. In the second class are such things as feed, seed, fertilizer, extra hired men. We say that factors of the first class are fixed because they have to be provided for, and the expenses connected with them have to be provided for irrespective of the amount of produce resulting from their use. And we call factors of the second class variable because they can be varied readily and because we expect a fairly direct variation in product with each variation of the factors. Now it should be clear to even the most superficial observer as it is to the practical farmer himself that the combined value of the fixed factors makes up by far the major part of the cost of farm production. The monetary valuation of the variable factors constitutes but a small fraction of the total investment. Another way of stating it is to say that the farm business to-day represents a large fixed investment. From this it follows that the productive factors which must be economized most in modern farm production are the fixed factors. But what does economy of fixed factors mean? What, for example, does economy in the use of land and machinery mean to the western wheat-grower? Or economy in the use of farm buildings to an Ontario stock-raiser? It means simply this, that in order to economize in their use, their capacity for use must be more fully taxed. And this can only be done by combining with them more of the variable and relatively less valuable factors. More hired men, more seed, more feed for the horses or more gas for the tractor, more oil and twine for the binder; these must all be added if fuller use is to be made of the land and large-scale machines. More cattle, more feed and more labour must be added if fuller use is to be made of the bank barn. But what is the inevitable result of all these attempts at economy in the use of the high-priced fixed factors? The result, or at least the hoped-for result, is increased product. It is only by dividing the burden among more people that the per capita taxation is reduced. And it is only by dividing the cost of maintaining a barn, a binder, or a milking-machine among more pounds of meat, more bushels of grain and more pounds of butter or cheese that that cost can be reduced. We are thus forced to conclude that lowering the cost of production implies increasing the volume of production. Whether we add more units of any factor or merely rearrange the existing units, added expense is involved and can only be recouped by obtaining additional product.

The obvious next question is what effect will the additional product have on the market price?? Right here is where the real weakness of the cost-reduction method comes to light. All attempts at increasing profits by reducing production costs assume that the selling price will remain either as before or at the worst will not fall in proportion to the drop in costs. The real question is, is that assumption justified? This should not be very difficult to answer. Whatever theory of price determination one holds (and they may vary quite considerably), he will admit that supply has some part to play in it. Whether the relation between supply and price be a close one or not, all will agree that it is direct in character, i.e., the greater the supply the lower the price and vice versa. This being the case what are we to conclude about the value of our cost-reduction method? Our sole consolation rests in the justifiable hope that all

farmers do not do as we do or when we do, that we get in our cost reduction work ahead of our neighbours. In other words if all the farmers were able to make the same cost reduction at the same time they would, so to speak, kill thereby the goose that was to lay the golden egg. That is, the margin between costs and selling price instead of widening would remain as before. The practical impossibility of all acting uniformly both in direction and in time makes it possible for those who get in on the ground floor in the matter of cost reduction to reap an advantage at the expense of their more tardy neighbours. The advantage is thus a purely competitive advantage. If a larger amount of product must be sold at a lower unit price, those farmers with the highest and unchanged costs stand to lose out, while those with the lowest and reduced costs remain *as they were* from the profit standpoint. True the least efficient producers may be weeded out leaving the more efficient or lowest-cost farmers in possession of the field for future use. If one sees in such a process a positive gain he is entitled in a competitive society to keep on advocating the cost-reduction idea. If all we wish is to see one farmer gaining at the expense of another farmer, or the farmers of one province gaining at the expense of those in a neighbour province, or those of Canada gaining at the expense of those of Europe or the United States or New Zealand, or those producing milk and eggs at the expense of those producing beef and bacon, we may quite consistently stick to the same plan. In doing so we may be helping on the law of the survival of the fittest, the law of the jungle, and may consider that in hastening the working of that law lies the true long-run solution to the "farm problem". But we must remember that in doing so we are helping those who are already best able to help themselves and are leaving unaided those whose economic conditions constitute the real "farm problem". If we decide that these latter farmers must also be helped we shall be compelled to place less emphasis on the advocacy of the cost-reduction idea since that method is more likely to hurt than to help them, being nothing but a stimulus to competition for survival among the farmers themselves. The cost-reduction method may prove admirable when the interests of individual farmers or farm areas are being considered and may therefore be rated as a fine remedy for ailments *internal* within the agricultural industry. Many people to-day, however, are diagnosing the ills of agriculture as *external* rather than *internal*. That is they cannot locate the trouble in the manner in which farm production factors are related to one another in combination, but rather in the mal-relationship of the agricultural industry to other industries and particularly to those interests and industries with which it must deal directly when making sales and purchases. If such a diagnosis is at all correct it would seem only logical that less faith than heretofore should be placed in the cost-reduction idea and a correspondingly greater amount of attention paid to the second and third methods mentioned at the outset of the present article.

STUDIES IN APPLE STORAGE

I. The Influence of Fungicides on Flavour and Sugar Content [1]

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Previous studies on the keeping qualities of apples have been concerned chiefly with problems other than those which may be induced by the fungicidal treatment applied in the orchard. These have been discussed by Wallace (*1*) in a resume of the subject and a description of the work done at Long Ashton. It has been shown that the storage quality and chemical composition of apples may be influenced by: rootstock, age of tree, manurial treatment, cultural practices, thinning, ringing, and date of harvest. Wallace concludes that there is not sufficient evidence to make a general statement on the possible relationship between the storage quality and the chemical constituents of the fruit.

The observations and studies, of which those to be reported here form a part, were begun with the 1929 crop of apples on account of apparent differences shown in previous years in keeping quality of apples subjected to different spray treatments. There have been seasons when it was concluded from general observations that Bordeaux sprayed fruit exhibited better storage qualities than lime sulphur sprayed fruit. In order to seek an answer to this question a study of the problem was begun by storing several varieties from standard experimental spray plots for comparison.

The fruit was stored in a common ventilated warehouse immediately after harvest. Observations included changes in the ground colour, pressure tests at regular intervals, notes on pathological conditions and flavour of the fruit, as well as temperature, humidity and ventilation data of the store chamber. A discussion of the general storage conditions will form the subject of a later paper.

Effect of Fungicides on Sugar Contents

It is an accepted fact that spray materials applied to the foliage of plants may affect the rates of transpiration and respiration of the treated foliage. Furthermore, it has been shown by various workers that some spray materials may affect the starch content of the leaves on which they may be applied. Chuard and Porchet (*2*) have shown that Bordeaux and copper salts applied to the foliage increased the sugar content of gooseberries and currants. Ewert (*3, 4*) also reported a similar condition in currants as the result of Bordeaux sprays.

In view of these reports and as a result of blindfold tests on the flavour of the apples from spray plots made by the junior author and referred to by DeLong and Pickett (*5*), it was concluded that differences in flavour were at least partially due to differences in the sweetness of the fruit. Therefore analyses were made on the sugar content of four of the varieties stored from standard spray plots in 1930.

[1] Contribution from the Division of Botany, Experimental Farms Branch, Dominion Department of Agriculture.

[2] Pathologist in Charge and temporary Plant Disease Investigator respectively.

Materials and Methods

The fruit was selected at harvest for uniformity of size and colour for the plot and was placed in a carefully ventilated room of the common storage warehouse at the Experimental Station, Kentville, N.S., until required. The varieties included in the following tests were McIntosh, Ribston, Stark and Northern Spy.

Ten apples from each plot of each variety were selected as samples for sugar determinations. The fruit was peeled, cored and then minced in a food chopper. After thorough stirring, 20 gram samples were weighed out. To each sample was added 50 cc. of 95 per cent alcohol. The samples were again stirred, then placed in a large moist chamber for extraction over night. Following extraction, the samples were warmed and filtered. Several washings of water were used to eliminate all alcoholic odour from the residue in the filter. The filtrate was neutralized with 0.1n. NaOH, diluted to 500 cc. with distilled water and subsequently tested for reducing sugars. A 50 cc. portion of the original solution was inverted by the use of 5 cc. HCl (1.2 sp. gr.) at a temperature from 68—77°F. overnight. This solution was neutralized with 2n. NaOH the following morning and diluted to 100 cc. with distilled water, for determining total sugars.

All sugar determinations were made by the use of Fehling's solution. Since this method depends on the correct detection of a colour end point the potassium ferrocyanide test for free copper was used to eliminate this possible error. This procedure gave very close results on triplicate titrations. Sucrose was taken as the difference between total and reducing sugars.

Sugar in Ribston Pippins

The samples of Ribstons for sugar determinations were taken after four months storage. The fruit was really past its commercial storage life and exhibited some slight withering in all lots. The results of the sugar determinations are given in table 1.

Table 1.—*Sugar in Ribston Pippins.*

Plot.	Treatment	Reduc. Sugar	Sucrose	Total Sugar
1.	Bordeaux calendar	7.09	4.68	11.77
2.	Lime Sulphur	6.77	4.56	11.34
3.	Alum. sulph. mixture	7.08	4.46	11.55
4.	Sulphur dust calendar	6.89	4.11	11.01
5.	Control	7.02	4.13	11.16
1D.	Duplicate of Plot 1.	6.90	5.17	12.07
2D.	" " " 2.	6.71	4.42	11.13
3D.	" " " 3.	7.19	4.34	11.53
4D.	" " " 4.	7.30	4.15	11.45
5D.	Control	7.08	4.32	11.40
1 and 1D.	Average	6.99	4.93	11.92
2 and 2D.	Average	6.74	4.49	11.23
3 and 3D.	Average	7.13	4.41	11.54
4 and 4D.	Average	7.09	4.14	11.23
5 and 5D.	Average	7.05	4.23	11.28

The two lots of apples which had received during the spring spraying season Bordeaux mixture or aluminium sulphate lime sulphur mixture showed a higher total sugar content at the time these tests were made than any of the other plots sprayed or dusted or untreated.

On November 27, 1930, fruits from each plot of Ribstons were sampled for flavour. The taster was blindfolded and requested to place the various plots in sequence of typical flavour for the variety. Two tests on the original plots resulted in placing them 3, 5, 2, 1, 4 with the first plot the most desirable flavour. On the duplicate series the placing in two tests was 1D, 4D, 3D, 5D, 2D. No test on flavour was made at the time of sampling for sugar determination. It will be observed, however, that the poorest flavoured fruit on each of these tests was that which was later foud to contain the least total sugar.

Observations on firmness were made at the time of sampling for sugar analyses. In order of firmness the placing was, 3, 3D; 2, 2D; 1: 4, 4D; 5: 1D. The firmest fruit was of a golden colour with more than 50 per cent blush, while the withered fruit was perceptibly greener with less blush.

Sugar in Northern Spy

Fruit from the Northern Spy spray plots was sampled approximately three and one-half months after picking. The average analyses of duplicate samples taken within a week of each other are given in table 2. The individual results of each lot of samples are very close to the average and hence are not given.

Table 2.—*Sugar in Northern Spy.*

Treatment	Reducing	Sucrose	Total
Bordeaux mixture	9.32	1.64	10.96
Lime sulphur	8.17	2.43	10.60
Aluminum sulphate mixture	7.84	2.52	10.36
Iron sulphate mixture	8.12	2.63	10.75
Control	8.87	1.95	10.82

As in the Ribston plots the lot which received Bordeaux mixture had the highest total sugar. There is not as great a difference between the differently treated plots in this variety as in the Ribstons. The aluminium sulphate mixture is the only spray schedule which apparently caused appreciably less total sugar. The loss is in the reducing sugar.

The arrangement of the Northern Spy plots in order of decreasing firmness after two months storage was control, Bordeaux, lime sulphur, with the aluminium sulphate and iron sulphate mixtures interchanging for the lowest pressure tests. No observations were made on flavour or firmness of this variety at the time of sampling for sugar anlaysis.

Sugar in Starks

The Stark apples used in these tests were obtained from the Somerset spray plots, a series of standard spray tests continuing for a period of years. The sampling for sugar determinations was not made until the fruit had been in storage for over four months. The individual apples were firm and sound at this time and in a good condition for marketing.

TABLE 3.—*Sugar in Starks.*

Treatment	Reducing	Sucrose	Total
Bordeaux mixture	7.49	3.26	10.75
Lime sulphur	7.72	2.93	10.65
Aluminum sulphate	7.75	2.43	10.18

The results in table 3 represent the averaged results of duplicate spray plots. There were not sufficient apples from the unsprayed trees to make a comparable storage sample. Hence there are no data for sugar content of unsprayed fruit in Starks. As in the varieties Ribston and Northern Spy, the Bordeaux sprayed fruit had the highest total sugar content of the three treatments.

At the end of five and one-half months common storage the fruit from the plots sprayed with the aluminium sulphate lime sulphur mixture was the firmest and in best commercial condition. Twenty per cent of the lime sulphur apples, eighteen per cent of the Bordeaux fruit and seven per cent of the fruit sprayed with the aluminium sulphate mixture showed bitter pit at the time of final examination.

No tests were made on the comparative flavour of these plots.

SUGAR IN MCINTOSH REDS

Several series of samples were taken of McIntosh apples for sugar determinations. The final sampling was done after about four months storage and the data obtained were very comparable, in the arrangement of plots, with the previous samples taken earlier in the storage life of the fruit.

TABLE 4.—*Sugar in McIntosh Reds.*

Treatment	Reducing	Sucrose	Total
Bordeaux mixture	8.35	2.17	10.52
Lime sulphur	8.15	1.13	9.28
Aluminum sulphate	8.43	1.92	10.35
Iron Sulphate	7.95	1.41	9.36
Control	8.09	1.40	9.49

The sugar analyses given in table 4 show that in the variety McIntosh, the Bordeaux sprayed fruit again had the highest sugar content.

Tests on the flavour of the apples from the five plots of this variety were made after two months storage. There was little to choose between the Bordeaux, aluminium sulphate and control plots. The lime sulphur fruit was readily placed in a lower rating and the iron sulphate fruit was in a class by itself with a very poor flavour for the variety. The fruits in the latter plot were greener and the flesh had a greenish tint at this time.

After five months storage no fungus rot had developed. The fruit sprayed with the iron sulphate mixture had withered slightly but all other plots were firm. Internal breakdown had developed in the Bordeaux apples to the extent of 50 per cent of the fruit examined. There was no

breakdown in the control or the lime sulphur sprayed fruit. The two other plots each had approximately 10 per cent breakdown.

In firmness of fruit after three months in store the placing was Bordeaux, control, aluminium sulphate mixture, lime sulphur, and iron sulphate mixture.

There were three treatments in common to all varieties, namely, Bordeaux mixture, lime sulphur and the aluminium sulphate lime sulphur mixture. One variety, Stark, had no fruit available on the control plot on account of the presence of scab (*Venturia inaequalis*). For the purposes of a comparative summary to the three above treatments the following averages of all varieties are worthy of consideration,—

Treatment	*Reducing*	*Sucrose*	*Total*
Bordeaux mixture	8.03	3.0	11.03
Aluminium sulphate mixture	7.79	2.82	10.61
Lime sulphur	7.69	2.75	10.44

In all four varieties the Bordeaux sprayed fruit had the highest total sugar content. In two varieties the lime sulphur sprayed fruit had a higher percentage of sugar than that sprayed with the aluminium sulphate lime sulphur mixture, namely, Starks and Northern Spy.

Discussion

In a consideration of the data offered above it is evident that the Bordeaux mixture has an influence on the sugar content of the fruit. The total sugar is greater on the Bordeaux treated fruit than the untreated fruit of each variety. The control or untreated fruit has a sugar content, on the average, approximately equal to that of the lime sulphur treated fruit, although this does not hold true for each variety. The data given by DeLong and Pickett (*5*) show the Bordeaux sprayed fruit of Northern Spy and the lime sulphur sprayed fruit of Ribston Pippin as having the highest sugar content in the series analysed. The analyses on these two varieties as reported above were made on apples from the same spray plots as those used by DeLong and Pickett. The causes for these differences may have been in the selection of the sample, storage conditions or method of determinations. No reason can be offered for the consistent advantage shown by Bordeaux in the above data. The samples were carefully selected at harvest, stored uniformly and handled similarly throughout.

In comparing the sugar content of the fruit with firmness it will be seen that the Ribstons and Starks sprayed with aluminium sulphate mixture were the firmest apples at the end of the storage period and the Northern Spy and McIntosh apples sprayed with Bordeaux were the firmest in those varieties, being exceeded by the fruit from control trees only. From the results of the one years analyses the indications are that fruit sprayed with Bordeaux or aluminium sulphate lime sulphur mixture would be expected to have longer storage life and better eating quality than such fruit sprayed with other materials under conditions similar to those in 1930.

It may be found that one type of spray would be more suitable for a red-skinned or a russet type of apple than another spray. The russetting

frequently caused by Bordeaux mixture detracts from the appearance of the fruit, but with a spray calendar altered to eliminate that danger it would appear possible to benefit by the increased sugar content produced by the copper treated fruit.

The flavour or palatability of the fruit corresponds well with the sucrose and total sugar in the fruit. The lots of fruit highest in sugar were more palatable than those lots with the lowest sugar content.

There are many factors which might influence the sugar content of apples other things being equal. Magness *et al.* (*6*) have shown that the greater the leaf area per fruit the higher the sugar content. Others have shown that the scion stock, fertilizer treatment, cultivation, and position of fruit stem on the spur may all have an influence on sugars in the apple. The moisture relations of the season would also influence this. In the sampling for 1930 the possible effects from leaf area and position of fruit on the spur were not taken into consideration. All trees of the same variety had similar fertilizer and cultural treatment and were grown on crab stock. It is possible that the effect of leaf area per fruit is probably the one which bears the most relationship to the sugar content of the fruit itself.

No data were obtained in 1930 on leaf area. Bordeaux sprayed trees are generally accepted as having the greatest leaf area in a season which is not favourable to injury from this fungicide, as was 1930. In fact, during that year there was very little foliage injury on any of the standard spray plots. On the Stark plots the aluminium sulphate lime sulphur mixture caused some yellow leaf and leaf drop during midsummer. This may have been a factor in causing the fruit from these plots to have a lower total sugar content than those from the lime sulphur plots, but it is not stated here as the reason for such a difference.

Climatological factors during the 1930 season may have had an influence on the results presented. During the seven months April to October inclusive, the mean temperature was 1.87° above the sixteen year mean (54.66°); precipitation was 6.61 inches less than the sixteen year mean (21.56 inches) and total sunshine was greater than the sixteen year mean (1402.1 hours) by 80.8 hours. The preceding year, 1929, was very close to average in the above observations.

It is quite evident that in order to establish the effect of spray mixtures on the sugar content of apples it would be necessary to harvest fruit in a more selective manner than that used in 1930. Gross sampling unless carried out on a very large scale may not show the true difference since it is customary to use only 10 to 25 apples in samples of this nature for analyses.

Summary

Under seasonal conditions preceding and during the 1930 crop year the following conclusions may be drawn.

1. Applications of Bordeaux mixture tend to increase the sucrose and total sugar content of apples.

2. Applications of the aluminium sulphate lime sulphur mixture tend to increase sucrose and total sugar in some varieties of apples.

3. Lime sulphur sprays tend to depress the sugar content in some varieties of apples.

4. Flavour, as palatibility, is influenced by a change in the sucrose and total sugar content of the fruit. Apples of low sugar content are not as palatable as fruits of higher sugar content in the same variety.

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CURRENT PUBLICATIONS

91. The Canadian Farmer and the Machine Age. W. M. Drummond, Professor of Rural Economics, University of Toronto. Pamphlet No. 2 of the Machine Age Series. Published by the Social Service Council of Canada. Price 10c. per copy.

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THE SOIL PLAQUE AZOTOBACTER TEST FOR SOIL DEFICIENCY

A Try-out of the Test on Twenty-three Samples of Ontario Soils, May-August, 1931.

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The bacteriological test for soil deficiency used in the following investigations owes its inception to observations made by Winogradsky while conducting soil bacteria researches at the Pasteur Institute, Paris, reported 1925. While working with azotobacter he developed several new methods for determining their presence and studying their activities in soil. One of these was to add 5 parts of starch to a hundred parts of soil, add water sufficient to make the mixture plastic and then fill the mass into a petri dish, smooth off the surface and incubate in a moist chamber for a few days. He found, that, with some soil samples, colonies of azotobacter developed on the smooth surface of these preparations. In samples where the azotobacter developed poorly or not at all, he found that by applying lime and phosphorus the azotobacter growth was frequently stimulated and good colony development occurred. He concluded that such soils were lacking in these constituents and would probably respond in crop growth to the application of such fertilizers. He also suggested that this test might serve to indicate other soil deficiencies, such as lack of organic matter, available potassium, sulphur, etc.

Last year (1930) Dr. W. G. Sackett, of the Colorado Agricultural Experiment Station, reported having tested a number of Colorado soils by this method,—technique somewhat modified, and he found it to be of practical service as demonstrated in field experiments with sugar beets. When superphosphate was added to those soils which the soil-plaque test had shown to be deficient in phosphorus, increased yields of 1 to 6 tons of sugar beets per acre over unfertilized land were obtained.

Materials and Methods

The present investigation was undertaken to determine whether or not the claims made by Dr. Sackett for this method of testing Colorado soils would be substantiated with Ontario soils with different crops. To this end the staff of the Soils Division of the Chemistry Department of the College were asked if they could supply us with samples of soil from their fertilizer experiment plots in different parts of the Province for testing. This they gladly consented to do. Accordingly, twenty-one soil samples were obtained, representing several soil types and varying fertilizer treatment, from Norfolk, Simcoe, Peel, Welland, Perth, York and Huron counties. The Soils Division not only collected the samples but also air-dried and sifted them and determined their pH and their readily available phosphorus, such preliminaries being a necessary part of the procedure for the test.

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Starch was not added to the soil samples for the test, but in its stead a cane sugar solution, fifty grams of sugar to one hundred cubic centimetres of distilled water, was used. This was done because sugar is more readily available for the azotobacter than is starch which has to be changed to sugar by other microörganisms before it is available for azotobacter.

The technique used for the preparation of the soil plaques is as follows: (adapted from Sackett).

From each sample of air-dried, sifted soil, weigh out 4 portions of 50 grams each.

To portion 1 (check) add 2 c.c. of the sugar solution and sufficient distilled water from a graduate, a little at a time, constantly stirring until the plastic mass has the consistency of putty or modeling clay. The exact amount of water in this operation must be noted.

Transfer the moistened soil to a small culture dish about 50 x 20 mm. without cover. Smooth the surface off with a spatula dipped in water.

Place plaque at once in a large covered culture dish (24 cm. di.) on moist blotting paper, while the three remaining plaques of the set are being made.

To soil portion No. 2, add 2 c.c. of sugar solution and 5 c.c. of a 3 per cent sol. of potassium sulphate (K_2SO_4) equivalent to 0.15 grams, and enough distilled water to equal the total amount of liquid used in making the control. Mix thoroughly and mould into plaque for potash deficiency.

To soil portion No. 3, add 2 c.c. of sugar sol. and 5 c.c. of a 6 per cent. sol. of di-sodium phosphate (Na_2HPO_4—12 H_2O) equivalent to 0.3 grams, and distilled water. Mix and make into plaque for phosphate deficiency.

To soil portion No. 4, add 2 c.c. of sugar sol. and 5 c.c. of a 3 per cent sol. of di-potas. phosphate (K_2HPO_4) equivalent to 0.15 grams, and distilled water. Mix and make into plaque for phosphate and potash deficiency.

Place all four plaques in the large covered dish. Fix a piece of dry blotting paper in the lid of the dish to absorb evaporating moisture so that it will not drip on cultures. Incubate at 25° to 30°C. for three to five days.

Note—Where the soil has a pH of 6.8 or lower it will be too acid to favour azotobacter growth, therefore such acid soils must be first corrected by the addition of 5 grams of finely powdered $CaCO_3$ to each 50 grams portion and this should be thoroughly mixed with the soil in the dry condition before adding the solutions. Further, such soils will not contain azotobacter and consequently each soil portion must be inoculated with azotobacter. This is accomplished by making a finely divided suspension of azotobacter by removing the surface growth from a pure culture on a solid culture medium, to distilled water and adding 1 c.c. of this suspension to the solution before mixing with the soil.

Results

The results of the investigation are recorded in the accompanying tables.

TABLE 1.

Serial No.	Soil Sample	pH	P p.p.m.	Ca CO_3	Azo. Inoc.	Check	K_2 SO_4	Na_2 HPO_4	K_2 HPO_4	Soil Treatment	Crop Response to Phosphate Fertilizer in Field
1	NORFOLK Moore Villanova	7.2	54	–	–	– – –	– – –	– – –	++++	Check Plots, No Chemical Fertilizers Applied.	Peas—Good Wheat—Good Clover—Good
2	NORFOLK Honey Sample A	7.44	38	–	–	– – –	– – –	+++	+++		Wheat—Excellent Clover—Excellent
3	NORFOLK Honey Sample B	7.2	42	–	–	– – –	– – –	– – –	++		Wheat—Excellent Clover—Excellent
4	NORFOLK Lawrence Pt. Ryerse	5.67	37.5	– +	– +	– – – – – –	– – – – – –	– – – +++	– – – +++		Wheat—Excellent Clover—Excellent
5	SIMCOE Judd	5.95	42	– +	– +	– – – – – –	– – – – – –	– – ++	– – – ++++		Peas—Good Wheat—Good Clover– Good
6	Simcoe Plat II sand	7.27	85	– – – K* B	– + + + +	– – – – – – – – – – – – – – –	– – – – – – – – – – – – – – –	– – – – – – – – – – – – – – –	– – – – – – – – – +++ ++++		Alfalfa—Fair Potatoes—Fair
7	HALTON Switzer	7.4	180	–	–	– – –	– – –	+	++		Turnips—Good
8	PEEL Reid	6.94	72	–	–	– – –	– – –	– – –	+		Alfalfa—Good
9	HURON Birk Dashwood	7.42	31	–	+	– – –	– – –	++	++		Grains—Excellent Clovers—Excellent
10	HURON Snell Dashwood	6.93	29	–	+	– – –	– – –	++	++		Grains—Excellent Clover—Excellent
11	HURON Richardson	8.3	25	–	–	– – –	– – –	++	+++		Wheat—Excellent
12	PERTH Haggerty	7.85	26	–	–	– – –	– – –	++	+++		Wheat- Excellent

TABLE 2.

Serial No.	Soil Sample	pH	P p.p.m.	Ca CO_3	Azo. Inoc.	Check	K2 SO_4	Na2 HPO_4	K2 HPO_4	Soil Treatment	Crop Response to Phosphate Fertilizer in Field
13	WELLAND I.	5.48	30	+	+	- - -	- - -	++	++	Superphosphate (16%) 400 lbs.	Wheat—Excellent
14	WELLAND II.	4.9	155	+ +	+ +	- - -	++ (++)	+++	+++	Tri. cal. phos. (23%) 2000 lbs. + sulphur	Wheat—Excellent
15	WELLAND III.	6.28	18	+	+	- - -	- - -	++	++	Lime only 4000 lbs.	Wheat—Very Poor
16	WELLAND IV.	6.25	24	+	+	- - -	- - -	+++	+++	Lime 4000 lbs. superphos 400 lbs.	Wheat—Good
17	WELLAND V.	6.31	205	+	+	- - -	- - -	+++	+++	Lime 4000 lbs. Tri. cal. phos. 2000 lbs.	Wheat—Fair
18	WELLAND VII.	5 63	52	+	+	- - -	- - -	++	++	Lime 4000 lbs. complete Fertil. 700 lbs.	Wheat—Very Good
19	WELLAND XI.	5.03	27	+	+	- - -	- - -	+++	++	Check	Wheat—Poor
20	YORK Reclaimed Swamp. Sample 1		413	-	-	++++			++++	4 years cultivation. Heavy phosphate application	Lettuce 1st year—Fair. 2nd year—Good. 3rd year—Failure.
21	" 2					- - -			+	Newly reclaimed. No fertilizer applied.	No crop grown.

The first twelve samples were taken from check plots to which no chemical fertilizers had been applied, located in fields that had been treated with phosphate fertilizers one or more times during the preceding three years. The data of crop returns from these fields and their check plots had been recorded. This data served as a basis of comparison with the soil plaque azotobacter test results.

Sample No. 1 (*Moore, Norfolk*) pH 7.2, available P., p.p.m. 54.

Gave very good spontaneous azotobacter growth on plaque 4, to which K_2HPO_4 had been added, but no growth of azotobacter on any of the other three plaques. The field in which this check plot is located had given good response to phosphate fertilizer on peas 1929, wheat 1930 and clover 1931.

Sample No. 2. (*Honey, A. Norfolk*) pH 7.44, available P., p.p.m. 38.

Gave good spontaneous azotobacter growth on plaque 4, K_2HPO_4 added, also on plaque 3, Na_2HPO_4 added, but no azotobacter growth on either of the other two plaques. The field in which this check plot is located had given excellent response to phosphate fertilizers on wheat 1930 and clover 1931.

Sample No. 3. (*Honey, B., Norfolk*) pH 7.2, available P., p.p.m. 42.

Gave fair spontaneous azotobacter growth on plaque 4 but no growth on any of the other three plaques. The open field had given excellent response to phosphate fertilizers on wheat 1929 and clover 1930.

Sample No. 4. (*Lawrence, Norfolk*) pH 5.67, available P., p.p.m. 37.5.

Required treatment with $CaCO_3$ to correct the acidity and also inoculating with azotobacter as none were present in the sample. After this treatment plaques No's 4 and 3 gave good azotobacter growth but the other two gave none. The open field had given excellent response to phosphate fertilizers on wheat 1930 and clover 1931.

Sample No. 5. (*Judd, Simcoe*) pH 5.95, available P., p.p.m. 42.

Required correcting with $CaCO_3$ and inoculating with azotobacter. Plaque 4 gave very good azotobacter growth and plaque 3 gave fair azotobacter growth, but plaques Nos. 2 and 1 gave none. The open field had given good response to phosphate fertilizers on peas 1929, wheat 1930 and clover 1931.

Sample No. 6. (*Plot II. Simcoe sand*) pH 7.27, available P., p.p.m. 85.

Gave no spontaneous azotobacter growth on any plaque in the first test, gave similar results on the second test even after all plaques had been inoculated with azotobacter, but on the third test when kaolin was added to the sand to serve as a binder, good azotobacter growth was obtained following inoculation on plaque 4, no growth on any of the other three plaques. In a fourth test where bentonite was used as a binder in place of kaolin, the azotobacter growth was stronger than in the one where kaolin was added. It would appear that the colloidal properties of the kaolin or bentonite were needed in this light sand as well as the phosphate to enable the azotobacter to develop in the test. The open field had given only fair response to phosphate fertilizers on alfalfa 1929 and potatoes 1930.

Sample No. 7. (*Switzer, Halton*) pH 7.4, available P., p.p.m. 180.

Gave fair spontaneous azotobacter growth on plaque 4, a slight amount on plaque 3, but none on either of the other two plaques. The open field had gven good response to phosphate fertilizers on turnips 1930.

Sample No. 8. (*Reid, Peel*) pH 6.94, available P., p.p.m. 72.

Gave slight azotobacter growth on plaque 4, but none on any of the other three plaques. The open field had given good response to phosphate fertilizers on alfalfa, 1930.

Sample No. 9. (*Birk, Huron*) pH 7.42, available P., p.p.m. 31.

Gave fair azotobacter growth on plaques 4 and 3 but none on the other two plaques. The open field had given excellent response to phosphate fertilizers on grains 1929 and clover 1930.

Sample No. 10. (*Snell, Huron*) pH 6.93, available P., p.p.m. 29.

Gave fair azotobacter growth on plaques 4 and 3 but none on the other two plaques. The open field had given excellent response to phosphate fertilizers on grains 1929 and clover 1930.

Sample No. 11. (*Richardson, Huron*) pH 8.3, available P., p.p.m. 25.

Gave good azotobacter growth on plaque 4, fair on plaque 3, but none on either of the other two plaques. The open field had given excellent response to phosphate fertilizers on wheat 1930.

Sample No. 12. (*Haggerty, Perth*) pH 7.85, available P., p.p.m. 26.

Gave good azotobacter growth on plaque 4 and fair on plaque 3, but none on either of the other two plaques. The open field had given excellent response to phosphate fertilizers on wheat 1930.

It will be noticed that in the above group of twelve soil samples obtained from six different counties in Ontario: (a) not one sample showed any azotobacter growth in the check soil plaque to which no nutrients other than the sugar solution, common to all, had been added; (b) that not one sample showed any azotobacter growth in the plaque to which K_2SO_4 had been added; (c) that eight out of the twelve samples gave azotobacter growth in the plaque to which Na_2HPO_4 had been added; (d) that all twelve samples gave azotobacter growth in the plaque to which K_2HPO_4 had been added. The azotobacter growth that occurred in the two series of plaques to which the phosphates had been added was spontaneous except in four instances—serial No's 4 and 5, which had an acid reaction and so had to be corrected and inoculated, and serial No's 9 and 10, that were inadvertently inoculated. It is evident, therefore, that azotobacter were present in all the soil samples except those that had an acid reaction, but that phosphates were needed in all cases to make the azotobacter sufficiently active to show growth as colonies on the plaques. The available P. in these samples, as shown by the chemical test, varied from 25 p.p.m. to 180 p.p.m.

It should be borne in mind that these samples had been taken from check plots to which no fertilizers had been added, located in fields to which phosphate fertilizers had been variously applied during the preceding three years. The crop yield from the treated open fields as compared with the crop yield from the untreated plots within the fields showed beneficial results following the application of the phosphate fertilizer.

It would therefore appear from the above observations on this series of twelve widely varying soil samples that there was a fair amount of correlation between the azotobacter soil plaque test and the field crop test for soil deficiency.

The next samples in the series, numbers 13 to 19 inclusive, constitute a group by themselves. These were all taken from fertilizer experimental plots located in Welland County. A different fertilizer treatment had been given to each plot twice in a five year rotation, over a period of ten years, and crop returns recorded. These samples were all acid clay soils and each sample had to be corrected by the addition of $CaCO_3$ and inoculated with azotobacter for the test.

Sample No. 13. (*Welland I.*) pH 5.48, available P., p.p.m. 30.

Gave fair azotobacter growth on plaques 4 and 3 but none on the other two plaques. This plot had been given an application of superphosphate (16%) 400 lbs. per acre. Its crop response in wheat was very good. However, it will be noted that in order to get azotobacter growth in the test it was necessary to add more phosphate, as plaques No's 1 and 2 gave no azotobacter growth.

Sample No. 14. (*Welland II.*) pH 4.9, available P., p.p.m. 155.

Gave good azotobacter growth on plaques 4 and 3, also fair growth on No. 2, but none on No. 1. This plot had been treated with tri-calcic-phosphate (33%) 1000 lbs. per acre, and had given very good crop results in wheat. However, seeing that plaque No. 1 had given no azotobacter growth, it would appear that although the phosphate present in the soil had been available for the wheat it had not been sufficient for the azotobacter in the test, even though the chemical analysis (H_2SO_4 dilute acid extractive) of the sample showed it to have available P., p.p.m. 155. It will be noticed also that plaque No. 2, to which K_2SO_4 had been added, gave azotobacter growth. This was the only plaque in the whole series that so responded, and thinking that possibly a mistake had been made, the test was run a second time with identical results. It would appear that the potassium sulphate in this case as well as the phosphate had been helpful to the azotobacter.

Sample No. 15. Welland III.) pH 6.28, available P., p.p.m. 18.

Gave fair growth of azotobacter on plaques 4 and 3, but none with the other two plaques. This plot had been treated in 1921 with lime only, at the rate of 4000 lbs. per acre. The crop growth of wheat on this was very poor. It will be noticed that this plot had the lowest available P. of all the series, only 18 p.p.m. by the chemical analysis.

Sample No. 16. (*Welland IV.*) pH 6.25, available P., p.p.m. 24.

Gave good azotobacter growth on plaques 4 and 3 but none on either of the other two plaques. This plot had been treated with lime (in 1921) 4000 lbs. and superphosphate 400 lbs. per acre. The crop of wheat from the plot was good.

Sample No. 17. (*Welland V.*) pH 6.31, available P., p.p.m. 205.

Gave good azotobacter growth on plaques 4 and 3 but none on either of the other two plaques. This plot had been given a treatment of lime

4000 lbs. (in 1921) and tri-calcic-phosphate 1000 lbs. per acre. The crop of wheat from this plot was only fair, even though the chemical test for available P. gave 205 p.p.m., much the highest of all the series. It will be noticed, also, that even with this relatively high available P., as determined by the chemical analysis, the azotobacter did not develop on plaques 1 and 2, to which no phosphate was added, but gave good growth on plaques 3 and 4, to which sodium phosphate and potassium phosphate were added respectively. It would appear in this case that the azotobacter test was more closely allied to the crop returns than was the chemical analysis, possibly because the P. that showed up in the chemical analysis was not in a form available for either crop or azotobacter.

Sample No. 18. (*Welland VII.*) pH 5.63, available P., p.p.m. 52.

Gave fair azotobacter growth on plaques 4 and 3, but none on the other two plaques. This plot had been given lime 4000 lbs. in 1921, and complete fertilizer 700 lbs., per acre. The crop returns in wheat were very good.

Sample No. 19. (*Welland XI.*) pH 5.03, available P., p.p.m. 27.

Gave fair azotobacter growth on plaque 4, and good growth on plaque 3, but none on either of the other two plaques. The crop return in wheat was poor. This, being the check plot, had not received any chemical fertilizer treatment.

It will be noticed from the above Welland group of soils (samples 13 to 19 inclusive) that as in the former group, No's 1 to 12 inclusive, not one of the check plaques gave any azotobacter growth and only one of the group gave azotobacter growth in response to K_2SO_4. Every sample, however, gave good azotobacter growth where phosphate was added, either as Na_2HPO_4 or K_2HPO_4. According to the findings of the test, therefore, the soils all needed phosphatic fertilizers.

It should be borne in mind that the plots from which these samples were taken had been variously fertilized twice in five years, some of them with superphosphate, some with tri-calcic-phosphate and others with lime, sulphur and complete fertilizer. The chemical determination of the available phosphate present in the soil samples, however, shows that with the exception of the two plots to which tri- calcic-phosphate had been added, the P., p.p.m. was as low as, if not lower than that of the samples of the first group which were taken from check plots to which no fertilizers had been applied. It would appear, therefore, that the crops grown on these fertilized plots had utilized all or most of the phosphate added, except where it had been applied in the tri-calcic form, which is more slowly soluble in the soil. The wheat crop returns from these plots, as shown in table 2, had been good to very good in those plots where phosphate had been applied, and poor to very poor in those plots where no phosphate had been applied. The azotobacter soil plaque test indicated that more phosphate would be needed to give good returns for the next crop, even in those plots that had been previously treated with phosphates, as these had been depleted by the late crop.

As in the first group of soils so in this second group there appears to be a fair amount of correlation between the results of the azotobacter soil plaque test and the crop returns.

Two Samples of Swamp Muck Soil

In August we received two samples of swamp-muck soils for testing. These were from a large area of swamp land that had been cropped for four years. It had been heavily fertilized with phosphate fertilizers. The crops had been potatoes, onions and lettuce. A good yield had been obtained the first and second years. In the third and fourth years, however, the lettuce yield had been poor, and it was on this account that an investigation by the Chemistry Department was called for, a soil plaque test being one part of the investigation.

The soil is very light in weight, being largely composed of decaying vegetable matter, rather dark brown in colour. Soil plaques were made and the result was a heavy azotobacter growth of numerous colonies on the check plaque as well as on the plaque treated with 5 c.c. of 3% sol. of K_2HPO_4. This was the first check plaque in the twenty-one different samples of soil that we had tested which gave any azotobacter growth. Chemical test showed P., p.p.m. 413, which is very high in comparison with all the samples previously tested, in fact, about eight times the average P. content for the twenty samples.

Seeing that in the test the check plaque had given as good azotobacter colony development as had the plaque to which phosphate had been added, the indications of the test were that the soil did not need phosphate. This was borne out by the chemical test. Therefore we conclude that some factor other than lack of phosphate was responsible for the failure of the lettuce crop.

The area from which the other sample was taken was newly reclaimed swamp adjoining the first area and was in process of cultivation for the first time. It had not been fertilized. It was lighter in colour but very similar in texture to the older sample. Soil plaques made from this sample gave no azotobacter on the check plaque, but three azotobacter colonies developed on the plaque to which 5 c.c. of the K_2HPO_4 sol. had been added; thus indicating that a very small number of azotobacter were present in the soil but that the conditions were not satisfactory for their development, owing to lack of phosphates.

From these findings it is natural to infer that the older reclaimed swamp area which had been under cultivation for four years and had received heavy application of phosphate fertilizers had by this means developed a heavy azotobacter flora from the initial small numbers of azotobacter originally present, but, that, though conditions in the soil were thus shown to be optimum for azotobacter they were altogether unsatisfactory for the lettuce crop. Therefore, in this case, the plaque test was not satisfactory as an indicator of soil deficiency.

Response to Varying Quantities of K_2HPO_4 Solution in Soil Plaques

When we take into consideration that 5 c.c. of a 3% sol. of K_2HPO_4 added to 50 grams of soil, as in the test, is the equivalent of 15,281 lbs. of superphosphate per acre, and that 400 lbs. of superphosphate is con-

sidered a good application for the grain crop, it would appear from these tests that a much higher percentage of phosphate in the soil is required for marked azotobacter development than is required for a good crop of wheat. The amount used in the test is at the rate of thirty- eight times the amount usually recommended for grain crops. It would therefore appear that we might have all the phosphate in the soil required for a good crop of wheat and yet not have sufficient to give good azotobacter growth in the test.

For the purpose of determining the response of azotobacter to smaller quantities of K_2HPO_4 than that called for in the plaque test, a set of four plaques was prepared from one soil (No. 11. Richardson, Huron) to which 5 c.c., 2.5 c.c., 1 c.c. and 0.1 c.c. of 3% solution of K_2HPO_4 were added. The azotobacter colony growth on these plaques was excellent, fair, poor and very poor, respectively. From this it would appear that excessive amounts of K_2HPO_4 are essential in the soil to give maximum azotobacter growth, and that this quantity is probably far in excess of that needed for maximum crop returns.

Summary

In an attempt to estimate the value of the azotobacter soil plaque method of testing for soil deficiency, twenty-one samples of soil were tested with the azotobacter soil plaque test. The results were compared with crop returns.

The soils tested fall into three groups. The first group includes the first twelve samples of the series. These samples were taken from check plots to which no phosphate fertilizers had been applied. The plots were located in fields that had received applications of phosphate fertilizers in recent years, previous to being sown with various crops. These fields are located in Norfolk, Simcoe, Halton, Peel, Huron and Perth counties of Ontario, and represent a diversity of soil types.

The results of the test indicated that every sample needed phosphate for azotobacter colony development. The crop returns from the check plots from which the samples were taken when compared with the crop returns from the fields treated with phosphate fertilizers showed that marked benefits had accrued from the phosphate treatment. It would therefore appear that the results of the azotobacter soil plaque test in this case showed a correlation with crop returns.

The second group includes soil samples 13 to 19 inclusive. These were all acid clay soils from Welland County. They had been variously treated with chemical fertilizers, including superphosphate, tricalcic phosphate, lime, sulphur and complete fertilizer, twice during the preceding five years.

The azotobacter soil plaque test indicated that notwithstanding that fertilizer had been applied previous to cropping every sample required phosphate to enable azotobacter colonies to develop, just as in the case of the samples of the first group. Chemical determinations showed that the available P. content of these soils was no greater on the average than that of the soils in the first group. It would therefore appear that the phosphates added to these plots as fertilizer had been all utilized by the

growing crops except in the case where tricalcic phosphate was used, which, not being so readily soluble as the superphosphate, the crops had not so much benefited by it as in the case of the superphosphate, and more of it was left as a residue in the soil.

All things considered, there would appear to be a reasonably satisfactory correlation of the results of the azotobacter soil plaque test and crop returns in this group of soils, as was found in the first group.

The third group consists of just two samples of muck soils from a reclaimed swamp area in York County. One of these had been under cultivation and crop for four years being heavily fertilized with phosphatic fertilizer. The azotobacter soil plaque test from this sample showed a heavy azotobacter colony development on the check plaque as well as on the plaque to which phosphate was applied,thereby indicating that this soil did not need phosphates. As the last crop of lettuce from this soil had been very poor, it was evident that some factor other than lack of phosphates was the cause of the trouble. Therefore, in this case, the plaque test was not satisfactory as an indicator of soil deficiency.

The other sample was from an adjoining area that had only just been reclaimed and was under cultivation for the first time. No fertilizers had been applied. No azotobacter colonies developed in the check plaque, but three azotobacter colonies developed on the plaque to which phosphate was added, thus showing that even in the newly reclaimed swamp soil, a very few azotobacter occurred, but that owing to lack of phosphate they could not flourish.

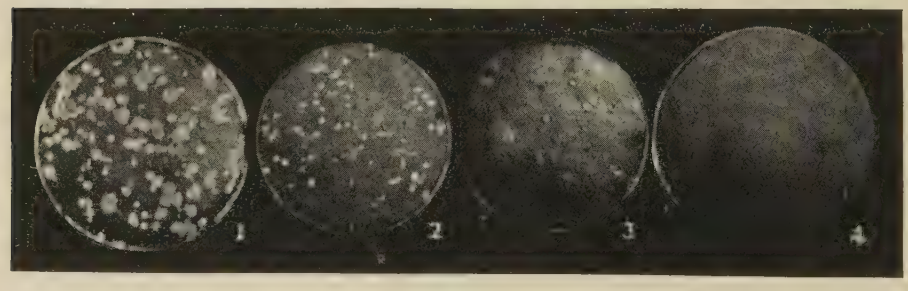

Figure 1. Azotobacter colonies on soil plaques showing response to application of varying amounts 3 per cent solution of K_2HPO_4.
(1) 5 c.c. (2) 2.5 c.c. (3) 1.0 c.c. (4) 0.1 c.c.

As 5 c.c. of a 3% sol. K_2HPO_4 added to 50 grams of soil, as in the test, is the equivalent of 15,281 lbs. of superphosphate per acre, which is thirty-eight times the amount usually recommended for a grain crop, four plaques were prepared to which 5 c.c., 2.5 c.c., 1 c.c., and 0.1 c.c. of a 3% sol. K_2HPO_4 was added, to determine if smaller quantities than that called for in the test would be satisfactory. The azotobacter colony growth on these plaques was excellent, fair, poor and very poor, respectively; thus showing that the large quantities of phosphate used in the test are essential for good azotobacter colony growth.

TWELFTH CONVENTION REPORT

PRESIDENTIAL ADDRESS

Presented at the Twelfth Annual Convention of the C.S.T.A.

H. S. Arkell[1]

In bidding you welcome to this, the twelfth annual convention of the C.S.T.A., I desire, first of all, to express our united pleasure at the presence with us again of our General Secretary, Mr. H. L. Trueman. Mr. Trueman has carried on a very difficult year's work under very difficult circumstances and that our organization is in as sound a position as it is, is due in large measure to his fine loyalty to the cause and to his persistent application to the unremitting task of making a successful showing under discouraging conditions. He will make a full statement of the general situation in his report and I shall not attempt to anticipate what he shall say. I should like, however, to pay tribute also to the work of Miss Dewan, whose assistance Mr. Trueman will, no doubt, himself recognize in his report.

Referring now to quite a different matter, may I take this opportunity of expressing the thanks of the whole association to the members of the Winnipeg local, to the Manitoba Agricultural College and to the Province of Manitoba as a whole for the generous and cordial invitation which they extended to us to hold our annual convention in Manitoba this year. The invitation was more timely and acceptable than may generally be understood. Let it simply be said that Manitoba's invitation provided a complete solution of our problem of where to go and what to do, and while I have no doubt that fitting acknowledgement will be made later on for the hospitality extended to us, I do not feel that this occasion should be let pass without this frank word of recognition and appreciation.

The honour you have conferred upon myself in electing me your President for the past year, permit me also to acknowledge in this sincere expression of regard. No man can come into contact with the members of the different locals throughout this country without arriving at a better understanding of the varied and important phases of the work which is being undertaken in the interests of agriculture and of the character and quality of the men who are engaged in it. To attempt to give expression to the achievements and ambitions and loyalties of such a class of men in an annual Presidential Address and at the same time to seek to give some lead to present day thinking and present day policy in the light of present day conditions is no light task indeed. At the same time one may not shirk such responsibility as is expected of your President and if one has learned anything as a result of his year's experience and if one finds in himself any convictions as to the lead that should now be given by technical agriculture, it seems only fitting that he should endeavour to give proof of the faith that is in him.

The first outstanding fact that seems to deserve statement is simply this—that as regards the problems of production with all their attendant

[1]Superintendent, Canadian Live Stock Cooperative, Ltd., Montreal.

issues, technical agriculture is accepted by the farmers of Canada as the final authority. This is a bold and comprehensive claim to make, but I believe it to be true. If true, it is a challenging and nationally important achievement. It means that in the realm of education, of research and to a considerable degree in administration, technically trained agriculturists, at least so far as production goes, have established themselves in a position of authority and responsibility that is nation-wide in its scope and accomplishment. This is the net result of fifty years of effort.

This position is, in a large sense all embracing. It embodies not only the routine procedure of practical farming, of farm management and of animal and plant production. It includes as well the direction of disease control, plant and animal, and commands consolidated support for large expenditures of public funds in maintaining a vast body of educational, investigational and extension work in all parts of the country. Broadly speaking, this work is devoted to the improvement of product quality, the lowering of production costs and to the education of our people, young and old, in the way of more efficient and successful culture of the products of the farm. Having regard to the hostility, contempt and ridicule met with by the pioneers in this movement, it is not too much to say that the work has been amply justified by the confidence it now inspires.

It will be admitted, of course, that disquieting things have occurred and still occur to interrupt the normal and orderly advancement of this half century of progress. One of these is the all-too-evident fact that the practical application in farm husbandry lags frequently much too far behind the teaching of the known facts of agricultural science. In other words, we must recognize that the mission of technical agriculture is by no means accomplished, even in the realm of production, when our knowledge is so far in advance of our practice. The coordination therefore, of education and extension on the one hand, with research and experimentation on the other, may well constitute one of the most significant and comprehensive problems which still confront us.

Having said this, may I now turn to another aspect of our agricultural situation which deserves our gravest and most determined attention. I refer to the drastically changing economic and industrial conditions which within the past two years have confronted agriculture with problems which can no longer be solved by the application of the old and orthodox methods which have been tried and proven in the past generation, but which are admittedly powerless to cope with the present unprecedented condition of human need. It is not my purpose to attempt an economic analysis of existing conditions. A plain statement of fact must suffice. In a word then, in our economic balance, the centre of gravity has shifted from the domain of production to the field of distribution, with the result that our highly specialized production machinery is now found to be out of gear. In the complicated primary-product distribution mechanism that modern ingenuity has set up to meet the tantalizing caprice of human demand, it is now beginning to be realized that the costs of distribution are out of all proportion to the returns to production. It is apparent, too, that the artificial restrains to freedom of trade, now so generally characteristic of national and international policy, create conditions where the intrinsic

value of a commodity in the light of recognized production costs, bears little relation to its sales value or for that matter, its exchange value, when it is offered for sale on the open market. In consequence of all this, the primary producer is accepting prices for his goods much below the prices of other commodities and to such a degree that unless remedies are found, we are facing the breakdown of the economic status of agriculture.

It is idle to say that all this is not the concern of technical agriculture. Yet I have heard expression given to this view by prominent men in this association. Such an attitude is to adopt the practice of the ostrich and bury one's head in the sand. It is true that our educational curricula have not been drafted with a view to developing our scholarship to enable it to cope with problems such as these. It is true also that our research activities have been directed into channels which deal with the things, animate and inanimate, with which the farmer works, rather than the economic conditions which constitute the foundation upon which he makes his living. Not only so, but it is true also that our administrative institutions, in the genesis of their policies, have taken cognizance rather of production opportunities than of merchandizing problems.

To say this is to cast no reproach upon the content, quality or advantage of our past work. I think I have already justified this remark by what has already been said as to the public recognition that has admittedly been accorded its past achievements. But it will assuredly be a reproach upon technical agriculture if it does not now determinedly organize itself to meet the changed problems of the present day, changed in nature and in application, just as it successfully diagnosed and found remedies for the current problems of the past two generations.

To this end, your executive has taken responsibility for convening a committee to consider what may be the duties and obligations in this matter of our association and to determine also, if practicable at all, in what way we may best proceed to meet this new and challenging situation. The report of this committee will be dealt with at a later stage in our programme, but I may be permitted, in view of the importance of the whole question, to anticipate somewhat the content of that report. It should be said at once that the work of this committee is still in a very tentative position and as well it will be your duty to say in what manner it shall be carried on. Further it is not clear that general agreement has been reached in all particulars. However, it may serve a useful purpose for me to endeavour to set down, as forming a basis for discussion, certain rather definite propositions or recommendations with respect to the procedure we may follow. For brevity's sake, I shall submit these in the barest possible outline and with little or no argument or explanation.

1. The Canadian Society of Technical Agriculturists should concern itself with giving lead to and coördinating the thinking of its own members, through the individual and official work of whom it should content itself with finding expression, rather than with public pronouncements of policy on its own initiative or authority. This statement affirms a generally accepted view but suggests that responsibility be taken for giving a lead to content, quality and character of work and policy itself as well as with

respect to its mechanical administration. The convention should consider how best this lead can be given.

2. In as much as agricultural education must provide the foundation for all advancement, let there be convened a conference of the heads of all Canadian Agricultural Colleges to consider the steps that can best be taken to provide the training to meet this need. As in Europe, the study and teaching of economics and civics must be made to serve the practical and public interests of our farm people in such fashion that college policy and college administration may stand for just as decisive, practical and convinced teaching through college lectures, short courses and rural debates of the subjects of coöperation, farm business organization, merchandizing, advertising, salesmanship, the mechanics and costs of distribution, as has been the case in the teaching of such subjects as farm management, the chemistry of soils, the control of insect pests or animal and plant nutrition. Let me quote from Principal Nicholas Murray Butler as to the function of Universities.—

> "The twentieth century University fails of its mission if it does not seek and *claim* leadership in this new movement of international understanding, international coöperation and international responsibility for meeting the grave problems which face mankind. It possesses a freedom of thought and action which is denied to the politically organized state, and which is quite impossible for the diverse and conflicting forms of religious belief. The University is the natural leader towards the new day, and no matter in what country its home be found, no matter what language it habitually speaks, it must rise to the full height of its new opportunity, and not only accept but *claim* responsibility for leading human effort into new fields of understanding and achievement and for inspiring humanity to new accomplishment. The University may not content itself with being only the expounder and defender of old and well-established truth; it must in justice to its history and its purpose *claim* its place of leadership in discovering and proclaiming truth which is new."

3. To supplement this, let there be set on foot a movement to inaugurate a programme of economic research into the processes, problems and costs of distribution, as to the reasons for the illogical and disastrous fluctuations in the prices of primary products as compared with those of industrial commodities and of the methods and measures to be taken for their stabilization. Lastly let it deal with the manner in which the safeguarding principle of tariff policy, now so generally predicative of party, national and international thinking, may be made to apply more equitably as between the producers of industrial and primary goods, particularly in a country such as Canada, where such a huge quantity of our agricultural produce must be exported. Perhaps this is equivalent to suggesting that we make the tariff a subject for national economic study rather than that it be continued as a divider of political doctrine, but we will let it go at that, although these words of Carlyle may not be out of place. Speaking of the New Day, he says:

> "We must some day, at last and forever, cross the line between Nonsense and Common Sense. And on that day we shall pass from Class Paternalism, originally derived from fetish fiction in times of universal ignorance, to Human Brotherhood in accordance with the nature of things and our growing knowledge of it; from Political Government to Industrial Administration; from Competition in Individualism, to Individuality in Coöperation; from War and Despotism, in any form, to Peace and Liberty."

4. Sensing that the best intentions or conclusions are usually abortive unless someone is definitely charged with carrying them into effect, the committee has proposed for your consideration that a recommendation be

made to the Dominion Minister of Agriculture that he appoint a man from his Department to act as the coördinating and unifying medium as between the Provincial and Federal administrations and farm organizations in putting into effect conclusions which may be jointly reached respecting method, work and policy.

5. Having regard to the fact that *Scientific Agriculture* is the mouthpiece of our organization, it is suggested that the Editor be supported and encouraged in making the Journal a recorder of economic research and the channel for economic reviews and discussions similarly as it has now become the recognized medium for research record and reviews in the other fields of agricultural science.

It may be suggested that this is an ambitious programme and one impossible of accomplishment. It is true that it may take years to make recognized headway but the pioneers in agricultural teaching, Mills and Robertson and James and Creelman, were not discouraged by the more difficult task ahead of them. Who shall say but that our task is equally important and equally necessary? In any event, I humbly and earnestly submit the above for your most careful consideration.

In conclusion, let me express the hope, on behalf of your Executive and of our hosts from this Province, that the programme which has been provided may fully merit your confidence and satisfaction and that this convention, held at a very difficult time in our national life, may prove as fruitful of accomplishment, as successful in promoting harmony amongst us and as stimulating in inspiration for the work that lies before us, as any in our career.

REPORT OF THE GENERAL SECRETARY

H. L. Trueman[1]

The period covering the activities of the Society from June 1st, 1931, to May 31st, 1932, has been a difficult one in many ways. While the progress of the Society has been handicapped by the general economic conditions prevailing, and while the General Secretary has not been able to give his full time to the duties of his office, progress has undoubtedly been made. The marked desire on the part of the Dominion Executive and the Executives of the local branches to do all in their power to carry on the work of the Society under these difficult conditions, accounts for this progress. To the Dominion President and all the officers of the Society I desire to express my sincere gratitude for the work they have done.

Membership

On May 31st, 1931, the membership of the Society, reported at the Guelph Convention, was 1,277, made up of 1,218 regular members, 6 life members and 53 student members. Since that time it has been necessary to remove the names of 108 regular members, and 39 student members have either withdrawn their membership or have become regular members. During the same period 53 regular members have been admitted and 26 new student members, making a total of 79 new members, and a

[1]General Secretary, Canadian Society of Technical Agriculturists, Ottawa.

grand total of 1,209 members. This is a net loss of 68 members. Considering the fact that a few members who were over one year in arrears were being carried and have since felt that they must resign owing to loss of income, and also considering the fact that the number of student members which joined this year has been practically cut in half, the net loss is not serious and does not indicate any lack of interest in the Society on the part of the general membership. The foregoing information is tabulated below.

1931 MEMBERSHIP:		
Life members	6	
Student members	53	
Regular members	1,218	
Total		1,277
TAKEN OFF:		
Student members removed	39	
Resignations, non-payment and death	108	
Total		147
Balance		1,130
NEW MEMBERS:		
Regular members	53	
Student members	26	
Total		79
Total present membership		1,209

An encouraging feature of the membership statement is that 53 new regular members have been acquired through the year without any active membership campaign having been conducted and in the face of salary reductions and uncertainty of employment. While the time is not opportune for a wide-spread membership campaign, it is in the interests of every local to keep constantly on the lookout for men who are in suitable circumstances to become members.

Scientific Agriculture

It has been pointed out from time to time in the report of the General Secretary that the publication of *Scientific Agriculture* has been financed largely through the advertising revenue and assistance from various institutions and departments. While the latter type of assistance has been maintained at a good level, advertising revenue has shrunk practically seventy-five percent. This is due to world-wide conditions and a similar shrinkage in advertising may be found in all periodicals with the exception of daily newspapers appealing direct to the consumer. This condition is further aggravated by the fact that the type of advertising solicited by *Scientific Agriculture* is designed to reach the farmer and those who influence him, and advertising to rural consumers has dropped in greater proportion than to urban consumers. Styles of advertising change and we find the radio absorbing funds which formerly went into magazine advertising.

It must be kept in mind that a large number of libraries and departments have subscribed to *Scientific Agriculture* and any drastic curtail-

ment in size or lowering of quality would soon be reflected in a reduced number of subscriptions and loss of interest on the part of many members of the Society to whom the Journal is the feature in which they are most interested. The size has been maintained to a point where we will be able to finish the current volume in August without a serious reduction in the number of pages. The matter of size and quality for the next volume depends entirely upon the arrangements which can be made for finances.

When *Scientific Agriculture* was enlarged in September 1927 it was not known just what the response would be in the way of scientific papers for publication. At first it was difficult to get enough material to fill the magazine each month but gradually Canadian research workers turned to it as a medium of publication and the supply of manuscripts on hand continually increased. Last year I stated that I thought the current volume (vol. 11) would show a better variety of material than previous volumes. With the idea of checking up on this I made a study of all the material published in volumes 8, 9, 10 and 11. Each article has been examined and classified and the total number of pages and percentage of pages given to each subject determined. Many articles appeal to two or three groups of men and consequently the percentages overlap, each article having been counted whenever it would appeal. That is to say an article of twenty pages on live stock marketing cycles in Canada would be listed as of interest to both animal husbandmen and economists. The results of this study may be tabulated as follows:

Page space occupied in Scientific Agriculture by articles appealing to various groups within the C.S.T.A. (Average of four volumes Nos. 8, 9, 10 and 11.)

Cereals	28%	Entomology	6%
Phytopathology	15	Poultry	5
Genetics	15	Seeds and Weeds	5
Chemistry	12	Dairying	5
Horticulture	12	Statistical Methods	2
Animal Husbandry	9	Agricultural Policies	2
Forage Crops	9	Apiculture	2
Bacteriology	7	Educational Methods	1
Economics	7	Veterinary Science	1
Soils	6		

It will be noted that cereals and cereal diseases occupy a large part of the space on the four year average. The articles which are of interest to the geneticist are largely on cereal and forage crops. A study of the material in volume 11 in comparison with the four volume average shows a change as anticipated.

Cereals	dropped from	28%	to	17%
Phytopathology	" "	15	"	11
Genetics	" "	15	"	8
Animal Husbandry	Increased from	9	"	11
Poultry Husbandry	" "	5	"	10
Economics	" "	7	"	14

This may be accounted for partially by the fact that the journal of the National Research Council is publishing some of the highly technical cereal articles and, more lately, articles touching other fields. It should be em-

phasized that there is no conflict here. The steady pressure of an increasing number of articles makes it impossible for *Scientific Agriculture*, with its limited financial backing, to guarantee early publication as desired by authors in practically all cases. The type of article going to the *Canadian Journal of Research* appeals, in general, to only a limited number of members of the C.S.T.A. The type of article coming to us from our affiliated groups has a wider appeal. The Canadian Society of Agricultural Economics has been very active in seeing that papers on economics have been forwarded at regular intervals. As the group organizations develop within the Society it may be expected that the supply of material will be better balanced and hence of greater interest to a larger number of readers.

It is felt that the quality of the Journal has been improved somewhat during the year. A new type face, giving better legibility, was adopted in September with the beginning of volume 12. A new section called Current Publications was inaugurated and has been carried on without undue difficulty through the year. This section will in the course of the year include reviews of approximately one hundred important books, bulletins and articles of interest to our members. Occasionally it is necessary to review a book which is of only limited interest because of the fact that a complimentary copy of the book has been forwarded for review purposes. The section on Notes and News has been maintained, although perhaps not to quite as extensive a degree as desired. This is due mainly to the difficulties under which the managing editor has been labouring during the year . The addition of French abstracts of English articles published in each issue has met with the hearty approval of the French members and no doubt is also valuable for European subscribers. These last three sections of the magazine have all been printed in smaller type than that used for the original articles and approximately one-third more material has been given per page by this method. This also serves to distinguish these sections of the magazine from the more technical sections.

Articles have in general been shorter. This is a healthy sign, and the members will no doubt be interested to know that most of the manuscripts on hand show evidence of the authors' desire to present their information in as short a space as possible. In cases where articles are long, the editors will call for abridgment and it is possible that a definite page limit on the length of articles will be set for the next volume.

I desire here to acknowledge the great assistance of the French Secretary, Mr. H. S. Lefévre, who has edited the French articles and translated the abstracts of English articles. Without his help and the occasional assistance of other French members interested, it would not be possible ot maintain this important section of the magazine.

The Text Book Club

The Society has continued to operate a purchasing service for members, allowing a fifteen percent discount from the list price of agricultural and scientific books. There has been a drop in the amount of business conducted, but apparently a great many of our members appreciate the service. It was operated at only a slight loss this year and it is expected

that the fifteen percent discount will be continued unless conditions in the publishing industry get materially worse.

Local Branches

All local branches of the Society have functioned during the year. The new ones which were organized a year ago have made excellent progress and have been largely responsible for securing the new members who have come into the Society this year.

The programmes of the locals are varied and while there is no desire to standardize completely their programmes, it is felt that all the locals should be working on at least two or three of the same problems during the Society year. A further recommendation concerning this matter will be found in the report of the Progress Committee. The General Secretary desires to pay tribute to the faithful work of the Executives of the locals during the past year. Without their support it would be impossible to carry on the work of the Society.

Travelling

During the past year the amount of travelling done by the General Secretary has been distinctly limited. He has visited only those points of easy access, including the Directors' meeting and banquet held at the time of the Royal Winter Fair in Toronto and the annual banquet held by the Quebec local in Quebec City in February. An additional visit was made to the locals in Montreal. It is probable that on account of financial conditions, very little travelling will be done during the coming year.

The President, Mr. H. S. Arkell, succeeded in visiting the Prairie Province locals during two of his trips in the winter and also made a trip to Nova Scotia.

Group Organization

Several societies and groups have continued their affiliation with the C.S.T.A. The new Soils Group which was inaugurated last year expects to effect a permanent organization at the present convention. A new group is being sponsored by the agricultural engineers who are meeting under temporary organization this year. It is expected that these two groups will add strength to the work of the Society and encouragement to the Canadian workers in these particular fields.

Standing Committees

Following recommendations made at the Eleventh Annual Convention and carried out by the Board of Directors, the Committee on Agricultural Policies and the Committee on Educational Policies have been amalgamated. The ground covered by these two committees is now alloted to a Committee on Education and Extension. Owing to the fact that this committee was not organized until late in the winter and that they are surveying the field at the present time, no report will be presented this year. It was also decided that reports from the Committee on Marketing Education would henceforth be superseded by resolutions emanating from the Canadian Society of Agricultural Economics. By reducing the number of committees reporting, it is hoped that more time will be allowed for discussion of those reports which are presented.

Headquarters

The Society continues to occupy the headquarters at Ottawa provided by the five year agreement with a group of industrial organizations. During the past year the Registration book kept for visitors, contains the names of approximately 300 people who have used these rooms. The further occupation of these headquarters is a matter which must be fully considered in the light of present conditions.

Employment Bureau

The employment service to members has been continued during the past year although very few positions have been available. On the other hand, technical agriculturists as a group may consider themselves exceedingly fortunate in that very few of our members have found it necessary to change their occupation.

Twelfth Annual Convention

Considerable thought was given to the possibility of postponing the annual convention this year and also to the possibility of holding sectional conventions in the East and the West. Happily both of these ideas were discarded and we find ourselves in the midst of an exceedingly well-planned programme, arranged under the auspices of the Manitoba section of the Society. I wish on behalf of the officers and members of the Society to express our very great appreciation of the work done by the Manitoba Convention Committee. To the University and to Dean McKillican and his staff we express our appreciation of their activities on behalf of our comfort and entertainment. When it was found impossible to secure funds for special lecturers this year, the Manitoba section provided out of its own treasury, funds necessary to secure one special lecturer. This action was greatly appreciated by the Officers and Directors of the Society.

New Officers

Ballots for the election of the Officers of the C.S.T.A. for the year 1932-33 were opened on April 20th at the Society headquarters. A total of 804 members voted, with the following results: President, Dr. G. I. Christie, President of the Ontario Agricultural College, Guelph, Ontario; Vice-Presidents, Hon. Dr. J. A. Godbout, Minister of Agriculture, Quebec, P.Q. and Mr. L. H. Newman, Central Experimental Farm, Ottawa; Honorary Secretary, Mr. George H. Clark, Seed Commissioner, Ottawa.

Office Work

The routine office work of the Society, while disturbed to some extent by the Secretary's incapacity, has been capably handled by Miss M. Dewan with the assistance of a temporary stenographer. Miss Dewan worked under a great strain during a considerable part of the year and deserves credit for the efficient manner in which she handled much of the work hitherto done by the Secretary. With the help of an assistant she has completely revised the card index system and we now have a modern, efficient means of keeping our membership records. The accounting system was also improved over last year's system, and it is now felt that much of the office routine can be handled in less time than formerly.

Finances

The financial situation of the Society may be stated very briefly. Membership and government assistance toward the publication of *Scientific Agriculture* have remained fairly stable, but it was to be expected that under the circumstances prevailing there would be a decline in revenue from these sources. We have suffered a heavy loss in commercial advertising in company with all publications directly concerned with agriculture. Revenue from this source is approximately $3000 less than last year and $4000 less than each of the two previous years. Expenditures were approximately $800 less than last year and would have been $1500 less if it had not been for extra assistance required in the office during the incapacity of the Secretary. The office administration of the Society has always been economical and there is little room to reduce expenditure. The standard of excellence set for the journal of the Society leaves little room for reduction of expense without sacrificing efficiency in service.

The problem must be faced however. We enter the new year with a deficit of approximately $200 and every effort is being put forth to balance our probable income and expenditures for the coming year. We must be guided by the action of some of the committees which are yet to meet and the directors will face the problem before us.

Such a situation was often foretold by the late General Secretary. It has always been realized that the finances of the Society were on a rather insecure basis subject to the fluctuations of commercial advertising. For each $5.00 membership we have given services costing nearly three times that amount. In 1929 operating costs were approximately $15 per member; this figure has been reduced during the past three years to about $13.60 per member without, we believe, lowering the efficiency of the service.

The officers feel that the members should realize the necessity of standing by the Society in the present situation. It is not the first crisis the Society has met, nor is it by any means the worst. Other men faced more serious difficulties than we face today as the founders of the Society could tell you. We will find means to carry on and we expect the membership to stand loyally by us. I think we shall not be disappointed.

REPORT OF SPECIAL COMMITTEE ON C.S.T.A. POLICY

H. S. Arkell, *Chairman*[1]

At a meeting of the Board of Directors in Toronto in November last, the President proposed that a special committee be set up to consider what was the responsibility and what should be the policy of the C.S.T.A. as an organization, in light of the new and gravely difficult conditions under which agriculture was finding itself obliged to carry on. The Directors concurred in this proposal and appointed the members of the Executive together with two others, Dr. J. H. Grisdale and Dr. W. J. Black, as members of this Committee. The Committee was to report at the Annual Convention of the Society.

[1]Superintendent, Canadian Live Stock Cooperative Ltd., Montreal.

Two meetings of the Committee have been held, both of which while not fully attended, were fairly representatively attended by the duly appointed members. At the first meeting the whole situation was tentatively considered and the President was authorized to canvass the attitude and view-point of the different locals and the different officers and members as he had opportunity in the succeeding weeks. At the second meeting held in May he made a brief report of what he had learned and particularly referred to the varying view-point of different men and different locals with respect to the whole question at issue. The Committee, therefore, again reviewed the problem at some length and authorized the preparation of a brief report for the convention.

It was apparent that the committee took the view that the changing economic conditions imposed new responsibilities and called for changes in agricultural policy. It was apparent also that the members of the Committee were in agreement that the C.S.T.A. must accept a responsibility for studying the whole question and for endeavouring to give a coherent lead to its members in relation to the developments which must be expected to take place. They regarded it as essential, however, that the question should be generally reviewed by the whole convention and definite instructions given as to what action should be taken. To this end, this special period in our programme has been set apart for this discussion.

The committee proposed and agreed upon one particular resolution and this is submitted for your consideration. It reads as follows:

"Resolved that the C.S.T.A. view with approbation the progress of agriculture in Canada as shown by the creation of committees in certain provinces on which are represented Federal and Provincial officers for the purpose of studying and giving direction in the solution of specific problems, and further that it be recommended to the Federal Minister that he assign a suitable officer of his department to promote the coördination of all Federal and Provincial activities in which a closer relationship would be of benefit." This resolution was tabled by the convention for further consideration.

In addition to the above resolution the following suggestions included in this report as being taken from the Presidential Address were adopted as read or amended.

(1) The Canadian Society of Technical Agriculturists should concern itself with giving lead to and coördinating the thinking of its own members, through the individual and official work of whom it should content itself with finding expression, rather than with public pronouncements of policy on its own initiative or authority. This statement affirms a generally accepted view but suggests that responsibility be taken for giving a lead to content, quality and character of work and policy itself as well as with respect to its mechanical administration. The convention should consider how best this lead can be given. Carried.

(2) "In as much as agricultural education must provide the foundation for all advancement, that we recommend to the heads of all Canadian Agricultural Colleges that they consider the steps that can best be

taken to provide the further training to meet this need. As in Europe, the study and teaching of economics and civics must be made to serve the practical and public interests of our farm people in such fashion that college policy and college administration may stand for just as decisive, practical and convinced teaching through college lectures, short courses and rural debates on the subjects of coöperation, farm business organization, merchandizing, advertising, salesmanship, and the mechanics and costs of distribution, as has been the case in the teaching of such subjects as farm management, the chemistry of soils, the control of insect pests or animal and plant nutrition."

This suggestion was adopted with the recommendation that it be referred to the Canadian Society of Agricultural Economics with the request that they lay before the C.S.T.A. at the next convention a suggested course in Agricultural Commerce.

(3) "To supplement this, there should be a further development in the programme of economic research into the processes, problems and costs of distribution, as to the reasons for the illogical and disastrous fluctuations in the prices of primary products as compared with those of industrial commodities and of the methods and measures to be taken for their stabilization."

Carried and referred to the Canadian Society of Agricultural Economics.

REPORT OF THE C.S.T.A. COMMITTEE ON PROGRESS

W. V. Longley, *Chairman*[1]

Functions of the Committee

The by-laws of the Society state the duties of the Progress Committee as follows: (3b) "The Progress Committee shall devise means for stimulating the interest of the members in the work of the Society and shall actively engage itself in securing new members and new locals. It shall consider new plans and policies for the Society."

It was in an endeavour to further these duties that a meeting of the committee was held at the Royal Winter Fair in November and a "brief" prepared which was sent to the secretaries of all branches. A second "brief" was included on the Alberta Board of Agriculture as representing a definite move for the coördinating of work within a Province. This practise we believe is to be commended as an effort to place before the various branches material on problems which are receiving consideration by the officials and committees of the Society.

Thus it is that the Progress Committee is seeking to further the purpose for which it is constituted by attempting to obtain plans and policies that may be of assistance and which will further the best interests of the organization of which it is a part. Some of the suggested plans do not and may not meet with favor, but such is no reason why they should not come up for discussion before the various locals and thus members be

[1]Director of Extension and Professor of Agricultural Economics, Nova Scotia Agricultural College, Truro, N.S.

given an opportunity to express themselves. It is in order that C.S.T.A. opinion may be expressed that the Progress Committee would ask branches to be prepared to consider matters placed before them and their conclusions returned to the committee.

Activities of the Locals

The activities of the locals are varied and such depend to a considerable extent on the members in the respective locals. Thus a local with the membership comprised mostly of men in the commercial field is likely to take a different attitude on many problems than one with the members drawn from an institution or from the extension field. Again, some locals are very compact in the field from which they draw their members; others, the members are spread over a wide area and few are close enough together for many meetings.

The social activities of the locals thus vary with their location and make-up. There is though an increasing tendency to make more of the social activities of many locals and to break away from the "speaker type" of meeting. It is also true that locals are giving more attention to the committees of the Society and the work of the Society as a whole. Discussion groups are increasing and with their increase goes a better knowledge and keener interest in the work. One local Secretary in reporting on the activities of his local writes as follows: "We believe the suggestion concerning more discussion groups is a good one and will endeavor to carry this out. We attempted one or two discussion days this year with considerable success and believe that members meeting on a common footing at a C.S.T.A. meeting and without thought of departmental or private interests in any way influencing their remarks portends to a more frank and open discussion of subjects that are of real importance."

The British Columbia local with a membership of 109 reports the holding of informal meetings in various sections of the province under the direction of District Leaders. The Executive appointed these leaders last year for this purpose.

The committee wishes to recommend that C.S.T.A. committees seek to place briefs for study before the various locals and that these briefs be studied by the locals, thus furthering not only better informed membership but greater unity of action in the work of the committees. The work of the Committee on Educational Policies last year is an excellent example of where this was done by many locals and the interest shown was excellent. The amalgamated committee on "Education and Extension" is planning on the further consideration of their work by the locals. The present set-up of the Research Committee seeks to further like action by the locals.

Agricultural Policies

A better informed membership as to agricultural policies and their economic background is certainly much to be desired. How to obtain it is another matter? That there is much the C.S.T.A. can do we believe is right. Take as example, the address of Dean A. M. Shaw given at the C.S.T.A.-O.A.C. Alumni banquet at the Royal Winter Fair last November. Such an address, carefully prepared, well thought out, is a real contribu-

tion to agricultural policies. We believe that the C.S.T.A. can well further the giving of more such logical, well thought-out addresses, and that they not only be published in *Scientific Agriculture* but that we seek to have them published in the farm press as well.

Group Organizations

The ever increasing number of group organizations within the C.S.T.A. and their increasing influence raises the question of the relationship between them and the parent body. The C.S.T.A. is on record as being in favor of such group organizations. Business meetings of the C.S.T.A. in recent years suggest though that more interest should be taken in the business of the parent organization. There is the question of how far the groups should go in speaking for the C.S.T.A. While we believe that problems relating to any specific group should be considered and decisions made by said group, we believe that groups should report each year to the parent organization for discussion at the annual meeting such matters as are more than just of interest to the specific groups, that time shall be given for discussion of such matters before the general assembly, and that members generally should be informed as to said matters before they are brought to the vote of the general sessison. This should aid in furthering united action on matters of general interest, and in consolidating all groups back of the activities of the C.S.T.A.

W. V. Longley, *Chairman.*
J. MacGregor Smith
F. W. Walsh
E. F. Pineau

REPORT OF THE C.S.T.A. COMMITTEE ON RESEARCH

W. H. Brittain, *Chairman* [1]

Introduction

One of the most controversial subjects discussed at the 1930 Convention was the question of the work of this Committee and the proposal to abolish it altogether obtained a certain weight of support. There was, however, an even stronger feeling among the delegates present that, while the Committee may have failed to justify its existence in the past, it should not be abolished until a comprenhensive idea of the feeling of the general membership had first been secured and without first exploring the field to determine whether there did not, in fact, exist a definite role that such a committee might assume. The Committee was, therefore, reappointed with the distinct understanding that they would undertake first of all the two foregoing lines of work.

In line with this mandate, the thought of the membership all over Canada was systematically canvassed, organized and classified and the result presented at the Guelph Convention in June, 1931. This report at least placed the issues involved fairly before the delegates and considerable discussion developed. It soon became evident, however, that the subject was too broad to permit of adequate discussion and decision before such an

[1] Professor of Entomology, Macdonald College, P.Q.

unwieldly body, with a greatly overburdened programme, and the delegates unanimously relegated the final decision to the Executive Committee. The decision of the Executive Committee was briefly as follows:

1. That the Committee on Research should be continued and should be constituted as follows:

(a) A chairman elected "at large" by the convention.

(b) A committee consisting of one member elected by, and representative of, each affiliated society or group, the executive of each of the groups concerned to select a temporary representative to serve until their next annual meeting, and to prepare that part of the annual report involving the particular field covered by the group concerned.

2. That the chairman keep in direct touch with all locals for the purpose of encouraging the formation of local sub-committees on research, and other schemes for stimulating an interest in research problems.

3. That the annual report should consist of the following:

(a) An evaluation of the present status of each field of research, as gleaned from the reports sent in to each committee member by the workers in the field.

(b) An outline of the trends observable in each field of work.

(c) A statement of the needs and opportunities presented by each field of activity.

An effort was made to secure the data from the different members of the Committee in time to permit of adequate analysis and summary. Unfortunately, most of the members failed to submit data in time for this scheme to be carried out, and at the time of writing, several are still missing. Of these, Horticulture and Plant Pathology only have submitted abstracts of the problems engaging the attention of their members. Under the circumstances outlined the preparation of a representative report has been impossible.

Reports of Locals

Though all locals were communicated with only a few replied and a still smaller number sent reports. The Committee is grateful to those locals, which made the effort to supply us with the information requested. Owing, however, to the incompleteness of the record, the amount of overlapping with the group reports, and for considerations of space, and the fact that local problems only are discussed, it has been deemed inadvisable to print all of these reports in full. The British Columbia local presented the only report dealing with the general situation and, since it contains a number of constructive suggestions, it has been deemed advisable to incorporate it in this section of the report.

The following locals have reported local sub-committees or similar bodies for the study of research problems:

1. Montreal Branch.
2. South Alberta Branch.
3. Ste. Anne de la Pocatière Branch.
4. MacDonald College (McGill University) Branch.
5. British Columbia Branch.

Ontario Agricultural College and Northern Alberta did not form special research committees, but carried out research programmes.

REPORT OF THE BRITISH COLUMBIA C.S.T.A. COMMITTEE ON RESEARCH

Acting upon the recommendation of the Dominion organization, the Executive of the British Columbia Branch early this year appointed a Local Committee on Research. The members of this committee held a number of conferences to discuss, ways and means by which the Committee on Research may function more effectively, and, how information respecting the research activities of the members might be secured and tabulated. The committee considered that it could best protect itself through a questionnaire, a copy of which is attached. Thus, the responsibility for incompleteness of data devolves upon the membership. The questionnaire was sent to all members of the B.C. Branch but the response has been most unsatisfactory in that only 17 replies were received. The summary of papers published during the past year, as presented herewith is based entirely upon the reply to the questionnaire and obviously is quite incomplete.

As will be noted from the questionnaire, the members were asked for a list of research papers nearing completion. These have not been compiled and so are not presented herewith but are available should the Dominion committee so desire.

One can only surmise the purpose for which the Dominion organization requires the information respecting research activities of the members but, in any event, it is hoped that the data may be of value despite their incompleteness.

After giving serious thought to the suggestions as presented by the members and to the general question of C.S.T.A. policy towards research, your committee is convinced that the organization is more or less fettered insofar as promoting research is concerned. Only two points need be mentioned in support of this contention:

1. The organization lacks the necessary finances. Even the committee itself has not sufficient funds to enable it to function effectively. The possibility of securing funds for research from interested parties has not been overlooked, but here it is contended that the parties particularly interested in a problem under consideration would be more effective in securing aid than a general research committee. It may be, however, that the committee could support the individual in question to advantage.

2. The members of the C.S.T.A. are largely government and university employees. Thus, they are only in a position to make recommendations; they are not in a position to put their recommendations with respect to a progressive research policy into effect. The classifying and allocating of research projects, as have been suggested, must of necessity come to nought, as they have.

There appears, however, to be a very definite sphere of usefulness for a Committee on Research. It might, for instances, popularize research by means of articles in the daily and weekly press. Such articles might deal with the value of research, what it has meant in the past, what it would mean in dollars and cents if some of our present problems were solved. The members of the committee might prepare these articles or delegate qualified men to prepare them. The procedure, if properly followed, would probably do more for research, and the obtaining of financial support, than continued discussion and committee activity within the organization.

Again, the committee might well concentrate on the fostering and idealizing of Canadian research. For instance, each year prominent research men from outside Canada are brought in to address open meetings at the Annual Conventions, while Canadian men address the group meetings. Why not have an equal number of Canadian and non-Canadian Research workers address the open meetings under similar arrangements? This would not sacrifice the inspiration received through contact with noted authorities from other countries. This would be an incentive to the younger Canadian workers and give them an opportunity of comparing our men on an equal footing with those from other countries.

In conclusion the British Columbia Committee on Research wishes to submit respectfully the following recommendations for the consideration of the Dominion body:

1. That the Dominion Research Committee arrange for the publication of reviews of research in specific fields by prominent authorities and that such reviews include and evaluate Canadian contributions.
2. That either the Royal Society of Canada or the National Research Council in co-operation with the C.S.T.A. periodically review and report upon the agricultural research activities in Canada.
3. That encouragement and assistance be given to persons qualified and willing to present in popular style the contents of scientific papers.
4. That the Dominion committee on Research endeavour to popularize research by means of articles in the daily and weekly press.
5. That an effort be made to have Canadian research workers address the Annual Convention under arrangements similar to those for speakers from other countries.

It is realized that some of these recommendations, notably 1 and 5, are partially in effect, but it is maintained that they could be utilized still more effectively.

This report constitutes a summary of the report presented and adopted at the annual meeting of the British Columbia Branch recently held in Victoria.

British Columbia Committee on Research.

D. G. Laird,
V. S. Asmundson,
W. Newton.

May 12, 1932.

Reports of Group Organizations and Affiliated Societies

Reports on research work under way in different fields of Canadian Agriculture have been received from the following representatives of societies and groups affiliated with the C.S.T.A.:

Prof. J. G. Coulson, Macdonald College, P.Q.—Representing the Canadian Phytopathological Society.

Mr. M. B. Davis, Central Experimental Farm, Ottawa, Ont.—Representing Horticultural Group.

Prof. J. H. Ellis, Manitoba Agricultural College, Winnipeg, Man.—Representing Soils Group.

Mr. G. D. Matthews, Experimental Farm, Scott, Sask.—Representing Western Canadian Society of Agronomy.

Dr. J. E. Lattimer, Macdonald College, P.Q.—Representing Canadian Society of Agricultural Economics.

Mr. F. H. Reed, Experimental Station, Lacombe, Alta.—Representing Canadian Society of Animal Production.

It is not possible at the present time to print these reports as they are quite extensive in some cases. They are being made the subject of further analysis and it is expected that the societies concerned will supplement them during the current year. As the C.S.T.A. has accepted a place on the Advisory Committee on Agricultural Research of the National Research Council, it is anticipated that these reports will be of considerable value to the Society's representative on that body.

Summary

The primary difficulty in the efficient functioning of this Committee is the complete absence of funds. Practically every suggestion that has been made as to work that should be undertaken, either demands the ex-

penditure of money or makes demands upon the time and energy of already busy men. For this reason there appears to be no alternative, under the present circumstances, than to depend upon information voluntarily submitted by the membership.

The task of summarizing trends, status, needs and opportunities in the different branches of agriculture, as revealed by a study of the reports and abstracts submitted, is a most formidable one. Only a few of the most important points can even be touched upon:

1. *Composition of Report.* The method of securing information for such a report through the different groups instead of through local branches would appear, theoretically at least, to be the best procedure. The abstracts presented by certain of the groups should be of considerable value when or if a definite survey of agricultural research in Canada is attempted. Whether they should be printed as an appendix to this report is a matter which should be decided by the Executive.

Such a report does not and cannot reflect truly and completely the status of agricultural research in Canada. In the first place, we have no way of evaluating the work reported upon. In the second place, by no means have all the workers concerned forwarded data, but it is likely that the reports received constitute a very good "random sample" of the type of work being carried on in Canada in the fields reported upon and of the conception of research work entertained by those concerned.

Since the value of a report such as this depends upon the close co-operation of a number of workers in different fields the personnel is of the utmost importance. It is urged that the various groups should elect representative men who are active research workers in their particular field and who are in a position to devote the time and energy to the work of the Committee that the situation demands.

2. *Status of Research.* The character of the reports and abstracts secured by the Committee indicates that marked progress has been made in research in agriculture since the first Committee on Research made its report. This advance has been uniform, progressive and symmetrical, involving the whole concept of research work, the method of approach, technique, point of view and method of analysis.

We are far from reaching the point, however, where we can afford to regard our efforts with any degree of complacency. Many of the outlines of work in progress submitted can only be described as feeble. Some indictated a total failure to grasp the fundamental problems involved. In other cases the work described had to do with little more than routine tests of the crudest sort. In still others single workers submitted lists of research projects, any one of which might well engage the attention of a staff of highly trained specialists. In spite of this, however, the general average of the abstracts submitted indicates a general situation far in advance of that of ten years ago from every point of view.

3. *Organization of Research.* Probably the most cogent, vigorous and frequent criticisms levelled at research institutions by those submitting briefs for last year's report, was that directed at the organization of research problems. A large proportion of the correspondents emphasized the

fact that there should be a better method of selecting problems to be attacked, of deciding who should attempt them, of determining the general methods of approach, of delimiting the scope of the proposed work and of assuring its continuity until the problem had been solved or the attempt had proved definitely fruitless.

The harmful effect of over departmentalization, resulting in problems being studied in pieces instead of as a whole, is painfully evident from a perusal of reports received. It is clear that, in too many cases, our research organizations are cast in the mold of a bye-gone era. The Chairman of this Committee ventures to quote from an article published in *Scientific Agriculture* four years ago, because it appears to reflect the thought of a considerable section of the research personnel:

"There is undoubtedly a need for some controlling, coördinating and directing agency that can encourage, direct and even enforce proper team work among our different organizations; that will discourage duplication and competition—an agency qualified to make a survey of existing facilities and assist constructively those in need of assistance; to act as a clearing house for information; and to put the worker in touch with the problem. Recognizing the important fact that the problems of agriculture can only be solved where those problems occur and only by those in contact with such problems, this agency would assist in guiding research work into its natural channels."

The need, as outlined above, undoubtedly still exists and it may be asked whether there has been any particular progress in this connection during the past three years? It must be admitted that such progress has been disappointingly slow. It would seem that it is the place of the technical agriculturists themselves to develop the kind of organization to make the fullest use of our research facilities. The situation demands a modernization, a realization, a realignment, a reconstruction of methods, viewpoint and organization that cannot be much longer delayed.

One of the first steps should be a survey of research projects, facilities and personnel in Canada and an effort made to evaluate the work being done or capable of being done with proper support. Any one appointed to undertake the survey will find his work simplified by the data obtained by this Committee, which, after checking by such a commissioner, may have a definite value. Properly done, such a survey would form the basis for future plans. If, however, it merely results in innocuous generalities, a colourless listing of projects underway or equipment available, it will be of no more utility than many other such surveys.

4. *The Case for Research in Agriculture.* With the research departments of all institutions and departments apparently bearing the brunt of admittedly necessary economies, the urge to justify research appropriations and endowments becomes acute. The really trifling sums that have been expended upon real research in agriculture by our government and the vital service already rendered in this field in spite of manifold handicaps, has been well stated by the General Secretary in his editorial in the April, 1932 issue of *Scientific Agriculture*. He might have added that, had the advice of those in the best position to know been

sought and utilized when general policies were being formed, the technical agriculturists might have been able to render even greater services. Unfortunate it has not been the invariable custom to ask the advice of the technical man when policies of expansion or reduction are being formulated. Were this the case, it is possible that sounder and more discriminating policies might be the rule. Neither does it always seem to be realized that, however sympathetic and earnest a government may be in advancing the interests of agriculture, no form of assistance can equal scientific service. To enable our agriculturists to meet their competitors on equal terms we should not fail to bring to bear on their problems the results of the latest discoveries in the application of science to the production, processing, distribution and marketing of farm products.

Nor is it to be supposed that this service should be limited to the field of agricultural production alone. Its ultimate effect may be most apparent in the sound development of the country's trade and commerce. Canada's position in the export trade for farm products has never been more critical than it is today. She finds herself with a surplus quantity of a larger number of products than ever before. It is imperative that they be sold abroad, but, with all of these she has to face the most formidable kind of competition. Behind every single product that is now in a position to command consideration in the export trade is to be found a network of services including education, regulation and research. Any farm product from eggs to apples might be taken to illustrate this point. As a result of higher standards of training there is now available a more adequate force of competent young Canadians trained and equipped in Canada to solve Canadian problems than ever before in our history. Any sudden cessation of activities or any failure to follow up the many unsolved problems that still confront us, will inevitably work an injury from which we cannot soon recover, not the least of which will be to the trained personnel. A geneticist, a plant pathologist, a chemist, or an entomologist is not something that can be improvised in a few months or years, for the fact should not be lost sight of that those who are now completing their work, or have recently completed it, are not only the result of a long and more careful process of training, but also of a more rigid system of selecting than ever before. Economies of the strictest kind are inevitable in these times, but vital services and trained personnel should be given first consideration.

One may well question, however, whether the facts of the case are as well known to those who control such expenditures as they are to this body and whether we have not overlooked a duty in keeping them so informed. What we would seem to require is a sort of agricultural "Science Service", possibly carried on from the General Secretary's office. Hardly any group of people except the technical agriculturist is without such a service today. Statements emanating from such a service should be honest, sound and dignified, but they should aim to keep the true facts of the case constantly before those who must pay the bills. The times demand that any organization depending upon public funds for support, should justify its continued existence. While no investigator can honestly promise anything or predict the result of any investigation in advance, there are sufficient examples in the way of definite achievement available and a

sufficient number of vital problems now in the process of investigation, to place the work of the members of our organization in a better position in the public esteem than it enjoys today.

W. H. Brittain, *Chairman.*
J. G. Coulson.
M. B. Davis.
J. H. Ellis.
G. D. Mathews.
J. E. Lattimer.
F. H. Reed.

REPORT OF THE C.S.T.A. COMMITTEE ON PUBLICATIONS

L. E. Kirk, *Chairman*[1]

In discussing matters relating to the Journal, it became evident to the committee that drastic changes would have to be made in order to effect substantial economies. Your committee, therefore, begs to recommend as follows:—

1. The supplying of free reprints to contributors to be discontinued. These may be obtained in any quantity on a cost basis.

2. The number of cuts submitted with manuscripts to be restricted as far as practicable; extra cuts to be paid for by the contributor.

3. Manuscripts for publication to be restricted in length to twelve printed pages of the Journal including cuts; extra pages to be printed at one half the cost, namely three dollars.

4. The paper to be changed from the English glossy used at present to its equivalent in a Canadian product, with special paper for inserts only where absolutely necessary.

5. The reviews of books and bulletins to be continued, but publication of the list of new accessions to the Agricultural Library to be discontinued.

6. It is suggested also that the Editor should endeavour to secure a reduction in the rate per printed page.

These suggestions contemplate a saving of approximately one thousand dollars. Further economies in publishing the Journal may be effected only at the expense of reduced size and quality.

L. E. Kirk, Chairman.
E. D. McGreer
R. D. Colquette
G. B. Sandford
J. J. Gautreau

[1]Dominion Agrostologist, Central Experimental Farm, Ottawa.

APERCU HISTORIQUE SUR L'UTILISATION DE LA PAILLE ET SUR L'ETUDE DE SES CONSTITUANTS.

LIONEL LEMAY
Laboratoire de Chimie biologique, Faculté des Sciences, Université de Montréal

Le problème de l'utilisation de la paille concentre, depuis une quinzaine d'années surtout, l'attention de plusieurs biochimistes. Bien que l'importance économique et agricole de cette étude, importance soulignée encore récemment (*71*), ait suscité la présentation de nombreux brevets industriels, nos connaissances sur la composition chimique immédiate de la paille, ainsi que sur les multiples transformations que lui font subir les procédés de fermentation préconisés jusqu'ici, restent tout de même assez sommaires.

Nous nous bornerons, au cours de ce mémoire, à résumer les principales recherches accomplies dans ces dernières années surtout, sur l'utilisation de la paille dans son ensemble, de même que sur l'isolement et l'utilisation de ses principaux constituants chmiques, et à formuler les conclusions qui résultent de ces travaux.

I. UTILISATION DE LA PAILLE DANS SON ENSEMBLE

1.—*Comme engrais.*

La valeur de la paille comme engrais chimique tient en grande partie à sa concentration en matières organiques azotées. En effet, celles-ci sont décomposées dans le sol, par les bactéries principalement, en des produits assimilables par la plante. Cependant, les difficultés de réalisation, dans le sol, des conditions physico-chimiques et biologiques favorables à la décomposition de la paille ont fait pendant longtemps considérer la valeur fertilisante de ce produit comme à peu près nulle. Ainsi, A. Bischoff (*12*) cultivant la moutarde et le sarrazin dans un sol sablonneux additionné de paille de seigle très finement hachée, constate dans la récolte une diminution de la teneur en matière sèche et en matières azotées. Il note toutefois qu'en milieu argileux la présence de la paille n'a pas d'effet aussi déficitaire sur la récolte.

Peu après, B. Niklewski (*78*), au cours d'une étude sur la valeur nutritive de quelques sels pour la plante, remarque incidemment que l'addition de paille au sol diminue considérablement les propriétés fertilisantes du sulfate d'ammonium, surtout lorsque ce dernier est en petite quantité. Mais ayant constaté avec le nitrate de sodium l'effet contraire, l'auteur conclut qu'il y a lieu, dans ce cas, de tenir compte, non pas de l'influence de la décomposition de la paille, mais du fait que les propriétés physiques du sol sont modifiées plus ou moins profondément par l'addition de ce produit.

La pauvreté de la paille comme engrais est de nouveau signalée par O. Lemmerman et A. Einecke (*64*) qui démontrent de plus que son action défavorable se poursuit pendant toute la durée de la décomposition (deux années au moins) même si elle est additionnée de substances glucidiques ou d'autres engrais. Ils notent bien, comme B. Niklewski, que le nitrate de potassium corrige dans une certaine mesure cette action défavorable, mais ils attribuent au phénomène un autre mécanisme, d'ordre purement

chimique cette fois. Selon eux, la décomposition dans le sol s'effectuerait aux dépens d'éléments assimilables par la plante, éléments qui peuvent être empruntés au nitrate. Cette explication fait conclure aux auteurs que la teneur du sol en produits azotés assimilables ne peut être accrue par addition de paille.

L'exactitude de cette façon de voir est pourtant presqu'aussitôt infirmée par T. J. Murray (*74*) qui apporte de nouveaux éclaircissements sur le mécanisme de décomposition de la paille dans le sol. Murray observe d'abord qu'à la concentration de 0.1 à 0.7%, la paille accélère la nitration du sol, mais qu'au delà de cette concentration, la proportion des nitrates diminue, bien qu'il n'y ait aucune perte dans l'azote total du sol. En approfondissant davantage ces observations ce savant (*75*) en arrive à démontrer que la paille réagit sur le sol d'une manière indirecte. Elle favorise la reproduction des bactéries nitrifiantes, en leur fournissant le carbone nutritif, et ce sont ces bactéries qui utilisent le sulfate d'ammonium et le nitrate comme sources d'azote. Il s'ensuit donc une transformation correspondante de l'azote inorganique du sol en azote organique. Si les bactéries se multiplient trop rapidement, et c'est le cas lorsque la concentration en paille est très elevée, cette transformation s'effectue au détriment des éléments nutritifs de la plante. Comme les nitrates constituent une source excellente d'azote inorganique, cela justifie leur action palliative.

Il est intéressant de noter que l'explication de Murray rend compte des faits observés par Lemmerman et Einecke, dont il vient d'être question, et elle semble entièrement confirmée plus tard par les observations d'Otto Rahn (*87*).

D'après ce qui précède, on doit attendre de meilleurs rendements de la paille comme engrais en la soumettant préalablement à une destruction bactériologique, afin d'éviter que sa présence dans le sol soit une cause d'appauvrissement en sels azotés assimilables. Des résultats encourageants furent acquis, en ce sens, par H. B. Hutchinson et E. H. Richards (*54*) qui réussirent à la transformer en un produit analogue aux engrais organiques par un traitement d'une durée d'environ trois mois dans des conditions d'aération et de température déterminées. La neutralité de la masse, ou une légère alcalinité, de même que la présence d'azote sous forme de carbonate d'ammonium, d'urée, de sulfate d'ammonium ou de cyanamide en accélèrent la transformation. Toutefois, la concentration de ces substances, calculée en azote soluble, ne doit pas dépasser 0.7%.

En traitant la paille dite "activée" (au moyen de bactéries fixatrices d'azote) par une solution ammoniacale renfermant au maximum 0.1% d'azote, les mêmes auteurs (*55*) réussissent à augmenter le taux d'azote de la paille, et à en accroître les propriétés fertilisantes.

La vitesse de décomposition bactériologique varie selon les conditions de milieu, de température et d'humidité. Cet aspect de la question est étudié par T. L. Martin (*70*). Il détermine à cet effet la quantité de CO^2 dégagé, l'accumulation des nitrates, le nombre et la variété des microorganismes. Selon E. Howath (*53*), la destruction s'effectue plus rapidement en présence de chaux. La paille peut, par ce traitement, perdre 50% de la cellulose et de la lignine qu'elle renferme.

La décomposition peut aussi se faire sur une paille préalablement traitée par une solution de soude, tel que préconisé par U. Gennaro et G. Rossi (*31*), ou encore sur un produit additionné d'une certaine quantité d'humus et d'eau comme le suggèrent W. V. Halversen et E. F. Togerson (*34*). Un procédé qui semble avoir donné de meilleurs résultats est celui qui est recommandé par K. C. Collinson et H. J. Conn (*16*), et qui consiste à ajouter à la paille une certaine quantité d'eau et de sels minéraux. Ces auteurs proposent le mélange suivant:

$(NH_4)_2SO_4$	60 lbs.
Superphosphate	30 lbs.
$KCl + CO_3Ca$	50 lbs.
Paille	1 tonne
H^2O (quantité suffisante pour 2 à 3 tonnes).	

La présence du CO_3Ca a pour but de maintenir la neutralité de la masse, condition essentielle au développement microbien. Ce mélange peut rendre de grands services dans l'agriculture.

D'après d'autres expériences, entreprises dans le même sens, par L. de Telegdy Kovats (*110*) en particulier, on peut même admettre que, fermentée dans des conditions d'aération déterminée, en présence d'eau, de sels minéraux et de culture "Adco", la paille peut devenir d'une efficacité équivalente à celle de l'humus.

Presque en même temps F. B. Smith, W. H. Stevenson, et P. E. Brown (*106*) publient, à leur tour, une formule d'engrais artificiel dans lequel ils mêlent la paille finement hachée avec du sulfate d'ammonium, des superphosphates, du carbonate de calcium, et une certaine quantité d'eau nécessaire au maintien de l'humidité de la masse. Ils soumettent le mélange à la fermentation aérobie pendant 5 à 8 mois. Ils constatent aussi que la présence de culture "adco" active considérablement la décomposition dont la marche est périodiquement contrôlée au moyen d'un procédé recommandé par O. Flieg (*30*) et basé sur le dosage des pentosanes renfermés dans le mélange. En comparant les propriétés fertilisantes de l'engrais artificiel ainsi obtenu avec celles du fumier au point de vue du dégagement de CO_2, de la nitration du sol, et du rendement en récolte, F. S. Smith et P. E. Brown (*105*) arrivent à la conclusion, tout comme L. de Telegdy Kovats, que l'engrais à base de paille peut être appliqué sans inconvénient sur un sol normal, et que les résultats qu'on peut en attendre sont presqu' aussi satisfaisants que dans le cas d'emploi d'humus.

D'autres techniques de décomposition sont proposées aussi par A. Demolon (*22*), pour accroître la valeur de la paille comme engrais artificiel. Dans ces décompositions, la lignine et les produits azotés sont, en règle générale, plus résistants à la décomposition que la cellulose.

Il résulte des travaux précédents que si la paille seule ne peut pas être avantageusement employée comme telle, son utilisation comme engrais rend quand même de grands services à l'agriculture si on la décompose préalablement en présence de certains sels minéraux. La présence de ces sels favorise le développement des bactéries nitrifiantes, lesquelles transforment ultérieurement en produits assimilables par la plante, les matières azotées de la paille. Les travaux de recherche ac-

complis ces dernières années marquent certainement un grand progrès dans l'étude de la paille comme engrais, bien que la plupart des auteurs jusqu'ici ne semblent pas avoir suffisamment précisé l'importance relative de chaque facteur d'ordre physique ou biologique intervenant dans le cours de la décomposition. Le contrôle chimique des processus de fermentation, condition indispensable à l'uniformité des produits, semble parfois insuffisant. Mais les résultats pratiques obtenus à date sont très encourageants et ils nous permettent de compter, à brève échéance, sur la meilleure solution du problème.

2.—*Comme fourrage.*

La détermination de la valeur alimentaire de la paille, réalisée par E. Beckmann (*6*), puis par W. Kerp, Franz Schroeder et B. Pfyl (*58*), démontre que ce produit constitue une nourriture de qualité moyenne pour les animaux autres que les ruminants. La paille ne renferme en effet qu'une très faible quantité de matières protidiques, environ 3.6% de matières lipidiques, et 26,12% de substances glucidiques, (calculées comme amidon), et 10% de cendres.

Les substances glucidiques ne se présentent toutefois pas sous forme d'amidon mais de cellulose. La cellulose est difficilement digérée, et les pentosanes ne le sont pas du tout; ce qui fait admettre à G. B. Van Kampen (*115*) la pauvreté relative de la paille naturelle ou moulue, comme produit alimentaire.

On a songé, il y a plusieurs années déjà, à faire subir à la paille un traitement préalable, afin d'accroître si possible sa digestibilité, et de pouvoir l'utiliser plus avantageusement comme fourrage. Parmi les divers traitements préconisés, les procédés à la soude sont ceux auxquels les auteurs ont jusqu'ici attaché le plus d'importance.

a) *Procédés à la soude.*

Selon F. W. Neger (*77*) le traitement de la paille par la soude aurait pour effet de la rendre plus digestible, non seulement à cause de l'élimination de l'acide silicique ou d'une partie de la lignine, mais aussi parce que la soude exerce une action dissolvante sur la lamelle moyenne, provoquant ainsi la dislocation des cellules.

K. Altmansberger (*2*) traite la paille par une solution de soude, en présence de vapeur d'eau sous pression. Il note que ce traitement dissout une partie de la silice, provoque la formation d'acide acétique par suite de la décomposition des pentosanes, et d'une certaine quantité de sucre résultant de l'hydrolyse de la cellulose. La valeur nutritive de la paille ainsi décomposée est longuement commentée par B. Bauriedl et O. Fallada (*4*) qui suggèrent finalement une légère modification dans la technique d'hydrolyse.

Elle est aussi étudiée d'une façon assez développée, et cette valeur est comparée à celle de la paille brute en 1917 par F. Hansen (*36*). Selon celui-ci, bien que le traitement à la soude et à la vapeur d'eau sous pression ait pour effet de supprimer la totalité des matières protidiques, des matières grasses et de l'albumine, il accroît de 157% le "coefficient amylacé"[1] du résidu non dissous. Hansen en conclut que la paille traitée

[1]Le coefficient amylacé (starch value) est la proportion de glucides calculée en amidon.

présente, d'une façon générale, une valeur nutritive supérieure à celle du produit brut.

E. Beckmann (*6*, *7*) préconise à son tour une modification dans le procédé à la soude, et recommande l'usage d'une solution d'alcali à 1-2%, et suggère d'effectuer la macération à froid. Ce procédé est aussitôt appliqué par H. Vagner et E. Schuller qui considèrent que la paille préparée de cette manière peut être avantageusement utilisée comme fourrage. Mais selon Gustav Fingerlin et Kathe Schmidt (*29*) le traitement à froid (Beckmann) et le procédé à chaud en présence de vapeur d'eau conduisent à des résultats à peu près semblables quant à la composition chimique du résidu.

Presqu'au même moment, Voltz (*117*) propose d'augmenter la valeur nutritive d'un tel produit en y ajoutant une certaine quantité d'urée: cette urée, selon lui, serait transformée en matières protéiques dans l'intestin des animaux. Cette synthèse se ferait aussi aux dépens de la cellulose de la paille. Toutefois, les auteurs admettent d'une façon générale la supériorité de la méthode de Beckmann, sauf W. Thoman (*113*), qui en recommande une très légère modification.

b) *Autres procédés.*

Hans Prinsgheim en 1919 (*86*) propose le traitement de la paille par CO_3Na_2 ou par $Ca(OH)_2$. La composition chimique des produits ainsi préparés et proposés comme fourrage, comparée à celle qui résulte du traitement à la soude, a donné les résultats suivants:

	Paille %	8% NaOH 4.5 hrs. 5 atm. %	8% NaOH 5.5 hrs. 100° 1 atm. %	12% NaOH 24 hrs. à froid. %	8% Na_2CO_3 3 hrs. 100° 1 atm. %	7.3% CaO 4.5 hrs. 5 atm. %	8% CaO 5 hrs. 100° 1 atm. %
Cendres	3.8	4.1	5.00	3.1	2.42	6.53	5.46
Protéines	2.7	0.9	0.94	2.3	2.00	0.92	1.74
Graisses	2.1	....	.....	1.3	.....	.....	.....
Pentosanes	26.2	31.1	27.90	26.3	27.50	21.35	27.88
Cellulose	39.5	56.3	52.40	48.6	52.03	53.90	48.57
Lignine	24.0	10.0	12.50	16.3	16.99	20.50	19.20
Rendement	....	53.	58.	79.	74.	63.	73.
Perte de subs. digestibles	....	26.7	24.7	8.6	11.27	24.9	17.0

On a déjà proposé l'usage de HCl: mais cette réaction ne paraît pas donner d'aussi bons résultats que la soude. En effet il résulte des observations de Hansen (*36*), que le traitement sodique augmente la valeur nutritive de la paille de 2.6 fois, tandis que le traitement chlorhydrique ne l'augmente que de 1.6 fois.

F. Honcamp et Blank (*52*) expliquent ce déficit par la formation, au cours de l'hydrolyse acide, de produits de clivage, qui entravent la digestibilité des divers constituants. Aussi, ce procédé semble aujourd'hui complètement abandonné.

Signalons enfin que E. Beckmann fait breveter en 1924, des procédés préconisant l'usage combiné de $Ca(OH)_2$ et de Na_2S, à la température ordinaire.

Aujourd'hui il semble acquis que le simple traitement à la vapeur d'eau donne de meilleurs rendements (*56*) que ceux à l'alcali.

3.—*Comme source de fabrication.*

a) *Du furfural.*

L'importance du furfural dans l'industrie est toujours croissante[2]. Il est beaucoup employé dans la fabrication des résines artificielles, des essences à moteur, des matières colorantes, etc.

On a pu l'extraire de la paille en faisant macérer celle-ci dans l'eau, pendant une demi-heure, à 180° sous 135 lbs. de pression par pouce carré: le furfural est ensuite recueilli par distillation de la solution aqueuse qui renferme tous les produits d'hydrolyse (*116*).

O. Routala et O. Kuula (*94*) ont obtenu un rendement en furfural de 9.57% du poids de la paille d'avoine contenant 26.67% de pentosanes. L'hydrolyse fut réalisée au moyen d'une solution de PO_4H_3 à 3%, réagissant à la température de 145° sous 4 atmosphères de pression pendant 15 heures.

On peut aussi opérer la distillation en présence de HCl, et V.I. Oborin (*81*) prétend que la paille done par ce prodédé un aussi bon rendement en furfural que le son de blé.

b) *Du gaz et du goudron.*

Roethe en 1923 (*92*) fait des expériences sur la distillation destructive de la paille, et obtient du gaz combustible, du goudron, du charbon et des liqueurs ammoniacales.

Le gaz est composé spécialement de CO (30%), CO_2 (26%), H (26%), CH_4 (15%).

Selon l'auteur, c'est une production très économique. On peut extraire, en effet, d'une tonne de paille (actuellement évaluée à moins de quatre dollars):

12,000 pieds cubes de gaz de 400 B.T.U.

640 lbs. de carbon,

15 à 20 gallons de goudron,

400 lbs. de liqueurs ammoniacales.

Le goudron obtenu se compose de toute une série de composés utilisés dans la fabrication des émaux, des ciments, des produits pharmaceutiques, des insecticides, des germicides, des matières colorantes, etc.

c) *De la pulpe.*

Un procédé allemand assez récent (*56*) permet d'obtenir une pulpe brune, ne contenant presque pas de lignine. Le procédé est simple: la paille est soumise à l'action de la vapeur d'eau à 5 atmosphères pendant 2 à 4 heures; elle est ensuite brisée dans des défibreurs à meules verticales, et finalement battue dans des "hollanders". Le rendement en pulpe est d'environ 67%; cette pulpe est environ 2 fois plus forte que celle que l'on obtient par le procédé à la chaux.

La liqueur aqueuse extraite peut servir comme agent fixateur, comme nourriture pour les animaux ou en teinturie tandis que les usages de la pulpe sont multiples et très économiques. On en fait entre autres des boîtes en carton (Toronto), des matériaux de construction (Régina).

(*à suivre*)

[2]Son prix qui était autrefois de trente dollars la livre est maintenant tombé à dix cents.

RESUME DES ARTICLES PUBLIEE EN ENGLAIS DANS CE NUMERO

LE CANADA ET LES MARCHES MONDIAUX. Dr. J. W. Dafoe, Editeur, Winnipeg Free Press, Winnipeg, Man.

Au cours de cette conférence faite au douzième congrès annuel de la C.S.T.A. le Dr. Dafoe a fait ressortir la nécessité d'abaisser les barrières douanières entre les nations constituant l'Empire Britannique. Le libre échange absolu cependant ne semble guère possible, le Royaume Uni devant de toute nécessité recourir à la protection pour son agriculture.

Il serait sans aucun doute difficile d'établir une monnaie d'Empire, cependant les différentes unités monétaires de l'Empire devraient pendant de longues périodes rester dans un rapport constant les unes par rapport aux autres. Ceci exigerait un assez bon équilibre des échanges entre les différentes nations de l'Empire.

L'auteur fait ressortir qu'il serait peu sage à l'Empire de lancer un défi commercial au reste du monde. Ceci provoquèrait des rèprésailles. Après la conférence impériale la Grande Bretagne devrait être en mesure d'établir des relations commerciales avec tous les pays prêts à accorder concession pour concession.

LA DIMINUTION DU COUT DE PRODUCTION. W. M. Drummond, Professeur Adjoint d'Economie Politique, Université de Toronto, Toronto, Ont.

L'auteur fait remarquer que les activités gouvernementales ayant pour but la diminution du coût de production des produits agricoles ont presque toujours eu pour résultat une augmentation de la production. Ceci s'accompagne souvent d'un abaissement des prix qui contre-balance l'effet de la diminution du coût de production. Il y a deux autres méthodes d'améliorer la situation des cultivateurs auxquelles on devrait maintenant accorder plus d'attention. D'une part, on devrait s'efforcer de diminuer le coût de la mise sur le marché, l'économie ainsi réalisée étant repassée au cultivateur sous forme de prix additionels. D'autre part, il faudrait s'efforcer de diminuer le coût des marchandises que le cultivateur doit acheter. L'idée que l'abaissement du coût de production constitue le principal remède à la situation agricole provoque une augmentation de la concurrence entre cultivateurs soit dans leur propre pays, soit d'un pays à l'autre.

ETUDE SUR LES POMMES. J. F. Hockey et R. W. Ward, Laboratoire fédéral de Pathologie Végétale, Kentville, (N.E.)

Dans les conditions climatiques de 1930 les conclusions suivantes peuvent être dégagées:—

1) Des applications de bouillie bordelaise tendent à augmenter la proportion de sucrose et de sucre total dans les pommes.

2) Des applications d'un mélange de soufre, de chaux et de sulfate d'alumine tendent à augmenter le sucrose et le sucre total chez certaines variétés de pommes.

3) Des pulvérisations à la chaux soufrée tendent à diminuer la teneur en sucre chez quelques variétés de pommes.

4) La saveur est influencée par la teneur du fruit en sucrose et en sucre total. Dans une même variété, les pommes contenant peu de sucre ne sont pas aussi savoureuses que celles contenant beaucoup de sucre.

L'ANALYSE DU SOL PAR LES AZOTOBACTERES. Dan. H. Jones, Professeur de Bactériologie, Collège d'Agriculture de l'Ontario, Guelph, Ont.

L'auteur décrit une méthode de déterminer la teneur d'un sol en phosphate par l'examen du développement de colonies d'azotobactères sur des plaques de sol spécialement préparées à cet effet.

Dans certains cas cette méthode donne des résultats satisfaisants mais dans d'autres cas il semble qu'un sol puisse contenir suffisamment de phosphate pour donner de bonnes récoltes sans pour cela produire un bon développement des colonies d'azotobactères.

AVIS

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CONCERNING THE C.S.T.A.

THE IMPERIAL ECONOMIC CONFERENCE IN ACTION

H. L. Trueman

For the past two weeks I have been enjoying the "Ottawa Conference" from the vantage point of the "press box." It is a good show for the Canadians present, but the international newspaper men find it rather tame. Lacking in generals and admirals and fiery delegates to provide sensational quarrels, there is little left but the perennial Irish problem and the Russian situation out of which to produce scare headlines, and since "Shawn" O'Kelly and "Jimmy" Thomas refuse to mix Free State politics with their bridge and their whiskey Russia has had to be the goat as well as the bear. Practically all the news given to the public during the first two weeks has been manufactured out of the official speeches on the first day and the lists of members appointed to committees. When the programme of committee meetings for any one day is posted on the Conference Bulletin Board it is possible to make up a fairly good story out of what the delegation leaders said at the opening, plus the known views of several members of the committee, plus the official "communique" handed out by Dr. Manion at the end of the day which says that the committee met and discussed what they were supposed to discuss. So far, this will account for most of the stories written. What "leaks" there have been to date have been of little importance because what they purport to reveal was said openly and frankly at the official opening.

The decision to hold a formal "public" opening was wise. While there is room for only a limited number in the galleries of the House of Commons, the movie-tone record will go to the ends of the Empire. The scene was impressive—nearly three hundred official delegates in formal morning dress standing at attention as Lord Bessborough walked to the Speaker's Chair and read the message from the King, the galleries gay with the colour of summer dresses of the ladies of the Conference, and then the measured words of each leader of each delegation—one felt that it was an historic moment.

There has been, and there will yet be, so much speculation about what is going on that it is well to review for a moment what was actually said officially on the opening day. For a brief review of conditions leading to the calling of the Conference and a discussion of some of the problems it faces, the reader can do not better than turn to the article by Dr. J. W. Dafoe, Editor of the Winnipeg Free Press, in this magazine. The point that impresses one about the Conference is that these facts as outlined by Dr. Dafoe were all well known to the experts and leaders of the various delegations many months ago, and, knowing these facts, they made certain statements showing the attitude in which they approached the Conference.

In their attitude toward Empire trade, the Dominions seemed to fall into two groups, although there is no suggestion that this represents a lining up of opposing principles; it represents rather a difference in conditions. South Africa, Newfoundland, India and the Irish Free State did not hold out any great hope of more favourable tariff preferences to increase their purchasing from the United Kingdom because of the following reasons: South Africa, because she already purchases more from the United Kingdom than she sells to it, being the only Dominion with a favourable trade balance with the Motherland; Newfoundland, because her main source of revenue is through tariffs on her imports, two thirds of which come from the Empire; India, because she also must secure most of her revenue from customs duties rather than from direct taxation and because she is going through constitutional developments requiring careful thought for the future of her industrial development; the Irish Free State, because of difficulties, which, though temporary, seem to be inherent to Irishmen. Canada, Australia, New Zealand and Rhodesia, however, spoke in a different tone. There was unanimous agreement in the attitude of these Dominions; they asked for preferences in United Kingdom markets on primary products, and they offered preferences in return on manufactured products, these preferences to be widened on the part of Australia to hitherto "protected areas in Australian industry which are not being exploited by Australian manufacturerers;" New Zealand offered to reduce where possible the duties on British goods and in certain cases increase the rates on foreign goods; Canada offered to lower the protection accorded to those industries "which now have reached maturity" and to others which are not "efficient". New Zealand

asked for quotas on Empire products; Australia asked for restriction of dumping, naming Russian wheat specifically; Canada asked the same by implication.

All Dominions urged the necessity of action to assist primary producers. Fears that the farmer would not have a loud enough voice in the Conference appear to be groundless; farmers throughout the Dominions have placed their case so strongly before their delegates that only the absolute necessity of the United Kingdom maintaining her trade contacts with the outer world will prevent them from getting most of what they ask in the way of preferences, quotas, duties and anti-dumping regulations. In the process of arranging preferences every one is not going to be entirely satisfied. Already Dominion producers in some agricultural lines have agreed upon their requests to the United Kingdom. Undoubtedly these requests cannot be met in all cases. On the other hand, Mr. Baldwin points out that the Dominions sell annually over 100 million pounds more worth of products to Great Britain than they purchase, while at the same time the Dominions purchase from foreign countries nearly 350 million pounds worth of goods annually. The Dominions must purchase more United Kingdom goods. If the group comprising Canada, Australia, and New Zealand holds out the greatest hope for increased purchases of these goods, there will certainly be some considerable diversions of trade from its present channels. Canadian manufacturers are wondering today just what industries in this country "have reached maturity" and just which ones are not "efficient." In diverting trade from foreign countries to the United Kingdom, the United States stands to lose most because the Dominions have unfavourable trade balances which they wish to reduce.

The action which will probably be taken by the Conference on monetary issues may be summed up in Mr. Bennett's words at the opening:

> "Concurrently with the primary task of enquiring into the fiscal proposal we have made, an examination will be carried on, by a committee set up for that purpose, into the monetary question with a view to agreeing on some plan to be made the basis of a discussion in a larger world conference, or of taking such measures as will be helpful, insofar as they may operate until action on a wider scale is possible."

The fear that there may be no results from the Ottawa Conference is groundless. There will be results, not spectacular perhaps, but important. As pointed out in the Birmingham Post, a journal entitled to speak for industrial England, "This Ottawa Conference will open with three assets which have been denied to any of its predecessers:

"The general world situation remains such as powerfully to impress upon all minds the really urgent need for imperial cooperation on the largest possible scale over the widest possible field.

"The fiscal policy of Great Britain today is such as to permit of the negotiation of reciprocal arrangements.

"The field has been surveyed in advance, in a new spirit of good will, with unique completeness."

Probably the best summing up of the possibilities of the Conference was given by Mr. Baldwin at the opening:

"The real importance of Ottawa lies in the fact that it marks the point where two roads diverge, the one leading to the development of purely national inerests, the other to closer Imperial unity, and to the recognition of advantages in mutual cooperation in trade. If when our task is finished we can say that we have definitely taken this latter road the actual distance progressed is of minor importance, because progress will continue, and in the future we shall always be approaching nearer and nearer to the goal."

COORDINATION OF AGRICULTURAL SERVICES

In addressing the twelfth annual convention of the C.S.T.A. at Winnipeg in June, The Hon. Robert Weir, Minister of Agriculture for Canada, spoke of the evident desire of members of the Society to continually improve the relationships existing between the various agricultural services. The Society, through the work of its Committee on Agricultural Policy and through the spirit of cooperation developed by its membership, had done much in an unofficial way to improve the effectiveness of the agricultural services of the country as a whole by discouraging unnecessary duplication and overlapping. Mr. Weir felt, however, that the time had arrived to set up some official agency which would be able to develop the various cooperative undertakings now under way into a more efficient coordination of services. He proposed that the system of joint federal and provincial

committees now working in several provinces be consolidated by the appointment of a national committee which would review and plan projects on a national basis. Mr. Weir asked the C.S.T.A. to consider this matter and advise him as to the desirability and possibility of setting up such a committee.

The Directors of the C.S.T.A. in discussing the proposal felt that it was in line with policies advocated by the Society for many years. Various committee reports, approved by the members, have from time to time expressed the views of the technical agriculturists on this problem. In the second report of the Committee on Agricultural Policies, the Chairman, Dean E. A. Howes, made the following summary of a survey on federal-provincial relations:

> "Any thoughtful student of the report of 1927 will agree that that report settled once and for all the fact that there is room for improvement in the relationship between the respective departments in their work of service to the people—who in the ultimate analysis ask for this service and expect to pay for it. The student will be struck also by the fact that it was clearly shown in the report that the relationship was not the same with all provinces, despite the information withheld by members of the committee who did not feel just free to express opinion. The other fact that seemed to stand out is that the report showed that there has not been any defined policy of relationship and that there is a need for such a policy—that will, as far as is materially possible remove from the shoulders of the workers a reasonable share of the onus for maintaining harmony and for giving definition. The report showed, too, that while there is little difficulty in the realm of teaching, there is need for the meaning of the word to be defined; that there is urgent need for coördiation in the field of research; that there is material conflict here and there in the enterprise of field work."

In an article on "Research in Agriculture" Dr. W. H. Brittain, Chairman of the C.S.T.A. Committee on Research has said:

> "There is undoubtedly a need for some controlling, coordinating and directing agency than can encourage, direct and even enforce proper team work among our different organizations, that will discourage duplication and competition—an agency qualified to make a survey of existing facilities and assist constructively those in need of assistance, to act as a clearing house for information and to put the worker in touch with the problem. Recognizing the important fact that the problems of agriculture can only be solved where those problems occur and only by those in contact with such problems, this agency would assist in guiding research work into its natural channels."

Dean H. Barton, viewing the problem as a whole stated in an address on "Beacon Lights for Professional Agriculture":

> "We have established extensive service machinery for the development of agriculture in this country and we are adding to it all the time. It has been built to operate in two fields chiefly, production and marketing. Within the limits of its possibilities, it has proved an efficient machine but it must be adapted to new conditions as they arise. It has become so extensive now that it presents problems of both coordination and amalgamation, and its continued efficiency must depend upon how successfully these are brought about. They are not being overlooked; the C.S.T.A. has them under consideration, individuals here and there are making them their concern and effecting some adjustment from time to time. Due care must be exercised that stability may not be sacrificed for the sake of change. There is great opportunity for leadership. In addition to careful study and sound judgment, it calls for broad minds and a measure of magnanimity."

Feeling that these statements represented the general attitude of the Society, the Directors authorized the Executive to convey to the Minister of Agriculture their approval of his proposal. This was done with the recommendation that the Dominion Department of Agriculture under the direction of the Minister undertake the establishment of a "National Advisory Committee on Agricultural Services." Invitations have accordingly been extended by the Minister to federal and provincial authorities to meet in Toronto during the week of August 29th to consider (1) the coordination of services on several important lines of work now developing and (2) the establishment of a permanent committee of technical men to carry on the work of further coordination.

Members of the C.S.T.A. have reason to feel gratified that the policy which they have so carefully nurtured since the inception of the Society appears now likely to bear fruit. The spirit of cooperation and good will which has gradually grown out of the activities of the past ten years is the best guarantee that men in the various services from coast to coast will give this policy their best support.

ITEMS FROM BUSINESS SESSIONS OF THE TWELFTH C.S.T.A. CONVENTION

Before reading his report at the first session of the convention, the General Secretary called attention to the fact that "Only one member of the C.S.T.A. has attended all the conventions of the Society. Three years ago there were three members with an unbroken record, Fred Grindley, Dean Barton and Dean Howes. At Wolfville in 1930 Dean Barton and Dean Howes kept up the tradition, but through illness Dean Barton missed the Guelph convention in 1931. While both the Deans are present today at Winnipeg, the record for unbroken attendance, and, we may say, for unbroken faith in the Society and service to its objects, goes to Dean Howes of Edmonton—long may he be spared to continue to meet with us." This announcement was warmly applauded.

Last month's issue of *Scientific Agriculture* carried a general account of the programme of the twelfth annual convention including the social activities. For the benefit of those who were not able to attend, the following information on the disposition of committee reports and on other items of business may be of interest. The reports of committees are printed in this month's issue and will be just briefly referred to here.

The report of the special Committee on C.S.T.A. Policy was considered with the original resolution passed by the committee and the further suggestions taken from the President's Address. The disposition of the first three suggestions is given in the published report of this committee. The recommendation that a liaison officer be appointed to act between Federal and Provincial Departments of Agriculture was laid on the table for future consideration. The Society did not care to make any commitments regarding the matter of studying tariff policies and in reference to the fifth suggestion they felt that the agricultural economists and the management of *Scientific Agriculture* were doing all they could to increase the amount of economic material in the magazine.

The report of the C.S.T.A. Committee on Progress was adopted as read.

The report of the Committee on Research was adopted, although it was impossible to take time to read the complete report of all research under way in the different fields of agriculture. The adoption of the report included the understanding that this committee would proceed along lines recommended in the report during the coming year.

The report of the Committee on Publications was discussed thoroughly and approved. It was felt that the Society faces considerable difficulty in securing funds for the publication of the journal on the basis on which it has been published. Consequently some changes will go into effect with the beginning of the next volume in September. There will be a slight reduction in the quality of the paper, but this will not affect seriously the illustrations and will give a page which is a little easier to read than the glossy surface we have been using. Articles will be limited to twelve pages in length, excepting in cases where authors are able to arrange for paymnt of additional pages at the rate of $3.00 per page, that is half the page cost. In general, however, the articles will remain under twelve pages in length with not more than two pages of illustrations included in the twelve pages.

The section of the magazine on current publications will be maintained and increased in size if possible. More news items will be carried in the section concerning the C.S.T.A. The type used in both of these sections will be changed to one size larger which will be easier to read. In cases where very fine work is required in reproducing photographs, it is probable that special paper will be used in the form of inserts. There will be no free distribution of reprints of articles published in the next volume. It is very regrettable that this economy has to be put into effect, but there seems to be no other way out at the present time. The list of accessions to the Main Library of the Department of Agriculture at Ottawa will not be carried each month as a mimeographed list published bi-monthly is available to all members of the C.S.T.A.

STANDING COMMITTEES

The report of the Nominations Committee was presented by Professor J. P. Sackville. The names and membership of the standing committees were read as follows:

Committee on Research

W. H. Brittain, Chairman, with representatives from affiliated Societies and groups.

Committee on Education and Extension

W. J. Black, Chairman; W. C. Clement, R. S. Duncan, A. M. Shaw, L. P. Roy.

Committee on Affiliations

J. M. Swaine, Chairman; J. Coke, F. L. Drayton.

Committee on General Membership

W. H. J. Tisdale, Chairman, with secretaries of local branches of the C.S.T.A.

Progress Committee

H. G. Crawford, Chairman; L. C. McOuatt, J. MacGregor Smith, W. F. Leslie, Geo. Maheux.

Finance Committee

J. B. Harrington, Chairman, with the Presidents of the local branches of the C.S.T.A.

Employment Bureau Committee

E. S. Archibald, Chairman; J. F. Booth, A. T. Charron, W. H. Wright, H. L. Trueman.

—Carried as read.

The report of the Resolutions committee was presented by Dr. J. F. Booth as follows:

1. RESOLVED that the C.S.T.A. express its appreciation of the excellent service to Canadian Agriculture rendered by the Main Library of the Dominion Department of Agriculture.

2. RESOLVED that the attention of the Canadian Broadcasting Commission be called to the aims and objects of the C.S.T.A. and that we offer the assistance of the Society in the development of radio broadcasting, with particular reference to agricultural programmes.

3. RESOLVED that the thanks of the C.S.T.A. be extended to all those institutions and departments giving grants to assist in the publication of *Scientific Agriculture*.

4. RESOLVED that this convention extend its most sincere appreciation to the President of the University of Manitoba and to the Dean of the Faculty of Agriculture for the hospitality extended in the providing of accommodation both in dormitory and classroom for the duration of the convention.

5. RESOLVED that the thanks of the convention be expressed to the Manitoba local of the C.S.T.A. and to all those who contributed to the most excellent arrangements provided during the week of the convention that have added so much to the enjoyment of all visitors. We especially wish to include in this our appreciation for the provision made by the local branch in bringing in the special lecturer in the person of Prof. L. J. Fletcher of Peoria, Ill.

6. RESOLVED that this convention express its deep regret at the inability of the President to attend the convention and its hope for Mrs. Arkell's early recovery from her unforunate accident.

7. RESOLVED that this convention express its sympathy to Dr. W. V. Longley, Chairman of the Progress Committee, in his illness and express its hope for a speedy recovery.

—Carried as read.

REPORT OF THE MEETINGS OF THE SOILS GROUP AT THE ANNUAL CONVENTION OF THE CANADIAN SOCIETY OF TECHNICAL AGRICULTURISTS

Chairman—J. H. Ellis Secretary—A. H. Joel

The first session of the Soils Group on Wednesday morning was opened by the Chairman by a brief review of the work of the temporary executive during the past year. A list of soil workers of Canada and a list of their activities had been made and sent to such soil workers, as communications Nos. 1 and 2. An organizing committee had been formed under the chairmanship of Professor G. N. Ruhnke and recommendations prepared for the consideration of the group at this year's meetings. A programme had been arranged, part of which consisted of a series of papers reviewing work in soil survey and research in the various provinces and the remainder, of papers covering a variety of subjects.

Reading of the minutes of last year's meeting was dispensed with and attention called to the publication of such minutes in the September, 1931 issue of Scientific Agriculture.

Papers by the following, outlining research and soil survey work in the various provinces, were presented:

Dr. D. G. Laird and Mr. C. C. Kelly—British Columbia.
Dr. F. A. Wyatt—Alberta.
Professor A. H. Joel—Saskatchewan.
Professor J. H. Ellis—Manitoba.
Professor G. N. Ruhnke—Ontario.
Dr. R. R. McKibbon—Province of Quebec.
Mr. E. M. Taylor—New Brunswick.
Professor L. C. Harlow—Nova Scotia.

Mr. S. Barnes read a report of the soils work of the Dominion Experimental Farm which was prepared by Mr. P. O. Ripley.

Before the closing of this first session the chairman appointed the following as a committee to nominate a slate for an Executive for the coming year: Professor J. D. Newton, chairman; Mr. S. Barnes; and Mr. J. C. Hide.

At the Thursday afternoon session the following papers were presented:

"Some Notes on the Movement of Water in Dry Sand Soils" by Mr. S. Barnes.

"Base Exchange Studies of Red River Valley Soils" by Professor J. H. Ellis and Mr. O. G. Caldwell.

"Soil Microbiological Activity as Influenced by Crop Sequence" by Dr. J. D. Newton.

"Preliminary Report on Investigations with Soil Fungi" by Dr. G. Bisby and Professor N. James.

"Preservation of Soil Monoliths"—Mr. F. F. Morwick.

The report of the committee on organization was presented by Professor G. N. Ruhnke, chairman. The report was accepted and the following recommendations voted on, clause by clause, and approved:

"That those interested in soil investigations in Canada organize for the present under the existing Soils Section of the C.S.T.A. That the matter of an independent organization of soils workers and the question of affiliation with other associations of soil workers be held in abeyance until some future more opportune time. That the executive be composed of a chairman, a vice chairman and a secretary. That a nominating committee be appointed from this meeting to nominate a slate of officers for 1932-33. That the scope of activities and the character of future programmes be carefully considered by the newly elected Executive during the coming year. That the following recommendation not be adopted at present, but that it be referred to the coming Executive: that provision be made to include non-members of the C.S.T.A. in this section".

At the Thursday evening session the following papers were presented:

"Preliminary Studies of the Vertical Distribution of Easily Soluble Phosphates in Some Representative Ontario Soils"—Mr. H. W. Lohse and Professor G. N. Ruhnke.

"Preparation of a Genetic Soil Map of Canada as a Project for the Soils Group"—Professor A. H. Joel.

"Soil Studies in Relation to Agricultural Research"—Mr. T. J. Jarvis.

A motion was carried to the effect that Professor A. H. Joel, University of Saskatchewan, be appointed chairman of a committee to promote the making of a genetic soil map of Canada, said committee to have at least one representative from each province.

The following Executive for the coming year was recommended by the nominating committee and elected:

Chairman—Professor G. N. Ruhnke, Ontario Agricultural College.
Vice chairman—Professor A. H. Joel, University of Saskatchewan.
Secretary—Mr. A. Leahy, University of Alberta.

NOTES AND NEWS

A. Leahey, (Alberta '25) Assistant in Soils, University of Alberta, Edmonton, who has been on post graduate work at the University of Wisconsin, has now returned to Edmonton.

W. W. Brookins, (Toronto '24) Professor of Agronomy, Panhandle Agricultural and Mechanical College, Goodwell, Oklahoma, is spending the summer at River Falls, Wis.

J. L. Albert, (Laval '17) is now occupying the position of Assistant Superintendent at the Experimental Station at L'Assomption, P.Q.

P. Stobbe, (Manitoba '31) has changed his address from Macdonald College, P.Q., to the New Ottawa Hotel, Cowansville, P.Q.

J. R. Pelletier, (Laval '27) has changed his address from Macdonald College to Experimental Farm, Ste. Anne de la Pocatiere, P.Q.

James Marshall, (Washington '29) who has been at Macdonald College, is now at the Entomological Laboratory, Annapolis Royal, N.S.

J. McBain Cameron has changed his address from Macdonald College to Greenwich, N.S.

R. P. Longley, (Toronto '31) is acting as Agricultural Representative for the county of Kings, stationed at the Experimental Farm at Kentville, N.S.

D. St. C. White, Assistant Agricultural Representative, who has been in the Annapolis district, has been transferred to Windsor as Assistant to C. E. Boulden, who is acting as Assistant Director during Dr. Longley's leave of absence.

C. M. Collins, (McGill '22) has returned from Toronto Universilty where he has been taking post graduate work and has resumed his duties as Agricultural Representative in Annapolis County, N.S.

D. E. MacPhee, (Toronto '31) has been transferred to Antigonish-Guysboro as Assistant Agricultural Representative with headquarters at Canso, N.S.

A. J. MacDonald is assistant Agricultural Representative in Cape Breton County with headquarters at Leitche's Creek, N.S.

W. T. Hunter, (Toronto '14) has recently been appointed Western Field Man for the Canadian Jersey Cattle Club. He is located at Kelowna, B.C.

A. Gibson, Dominion Entomologist, is in Europe attending the Fifth International Congress of Entomology being held in Paris.

L. S. McLaine, (Boston '10) is also in Europe attending the Fifth International Congress of Entomology and with Dr. Gibson is bearing the felicitations of the Entomological Society of Ontario to the Entomological Society of France on the occasion of the celebration of its centenary.

F. Hennessey, artist with the Dominion Entomological Branch, has recently been honoured by being elected a member of the Ontario Society Artists. Mr. Hennessey had a very fine group of paintings on exhibition at Wilson's Art Gallery, Ottawa, during the Imperial Conference.

R. C. Palmer, (British Columbia '21) formerly Assistant Superintendent, Dominion Experimental Station, at Summerland, B.C., has been appointed Superintendent to take effect from June 1, 1932. Mr. Palmer graduated from the University of British Columbia in 1921 where he won the Returned Soldier's Scholarship in 1920 and 1921 and the gold medal for proficiency in 1921, receiving his M.S.A. degree in 1923. During the past year he has been at the East Malling Research Station, East Malling, Kent, England, where he has specialized in horticultural research along lines of special application to the Province of British Columbia.

S. B. Stothers, (Toronto '16) Agricultural Representative for Essex County, Ontario, is transferring to Arthur, where he will serve as Agricultural Representative for Wellington County.

R. H. Clemens, (Toronto '12) Agricultural Representative for Wellington County, Ontario, is transferring to Essex County and will be located at Essex.

OMISSION

In the article on "Wound Gum in Peaches and Grapes," appearing in two parts in the March and April issues of *Scientific Agriculture*, the following footnote was omitted:

> Gratitude is expressed to Dr. D. L. Bailey, of the University of Toronto, for his valuable criticisms and advice during the course of this investigation; also to Dr. L. C. Coleman, formerly of the University, for his helpful suggestions in the early stages of the problem. Thanks are also due to Mr. E. F. Palmer and his staff at the Provincial Horticultural Experiment Station, Vineland, and to Dr. G. H. Berkeley of the Dominion Laboratory, St. Catharines, for their cooperation in connection with time and materials.

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